United States
Department of
Agriculture

Forest Service
Southeastern Area

Investment Analysis
of Upland Oak Stands

COMMON MEASURES AND THEIR METRIC EQUIVALENTS

1 inch . . . . 2.54 centimeters
1 foot . . . . 0.3048 meter (m)
1 square foot . . . . 0.0929 m²
1 cubic foot . . . . 0.028 m³
1 cord, 4 x 4 x 8 feet
(80 to 90 feet of
solid wood) . . . . 3.58 m³ (2.24 to
                              2.52 m³ of solid
                              wood)
1 board foot (12 x 12 x 1
inch thick, without
bark . . . . 0.00236 m³

Note: All references to board feet pertain to the ¼-inch International Scale.

Investment Analysis
Of
Upland Oak Stands /

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INTRODUCTION

The oak-hickory forest type is the most prevalent of the upland hardwood types. The oaks are most abundant in this type, usually occupying dominant and co-dominant positions within the stand. For this reason they are usually favored for management in the oak-hickory type as well as being highly favored in the more mesic, mixed-hardwood types. Therefore, this investment analysis is based on available growth and yield data for the oak component of upland hardwood stands. This analysis is not meant to cover all conditions and all species associations. It is primarily for oak stands, which were the basis for the yield data (Gingrich, 1971). The analysis also assumes intensive management of well-stocked stands with periodic thinnings.

Individual trees can be grown to larger diameters in less time by the use of well planned thinning operations, thus producing a higher quality product in a shorter rotation period. The question that remains is how much can you afford to spend, and at what stage of stand development, to get the highest returns for dollars spent. Once you know what to expect from this standpoint, various trade-offs to meet both timber and non-timber objectives can be considered more realistically. The following analysis assumes that thinnings throughout the rotation will be from below, leaving the best crop trees until the final harvest.

Basically, two stand condition classes have been analyzed. The first assumes the availability of even-aged stands of various ages that contain levels of growing stock which adequately occupy the site. The second condition assumes that growing stock levels are below that which would allow the stand to be carried at satisfactory stocking (Gingrich's C level) and must be regenerated. Because of past cutting practices, wildfires, and grazing, many of our upland hardwood stands fall into the latter category. They require an initial investment at age zero before they can be expected to yield their potential in either quantity or quality. As a comparison, analysis is made for both managed and unmanaged stands.

Gingrich's stocking guides (figure 1) are used to determine whether existing stands have (1) sufficient basal area in growing stock trees to carry through rotation, or (2) whether the stands should be regenerated. The C level of stocking is used as a minimum of basal area required to carry existing stands. Stands at the C level of stocking will fully occupy the site in an average of 10 years and are worth saving. Thinning would not be carried out unless the stocking of desirable trees is above the B level, which is near 60 percent of full stocking (table 1). This means that total basal area would need to be substantially above the residual B-level shown on the tables for existing stands before thinning to this level would be practical.

Table 1.—*Acceptable stocking levels for various average tree diameters*

Average tree dia.	Basal Area C level stocking	Basal Area [1] B level stocking
inches	square feet	square feet
3	24	38
4	28	47
5	34	53
6	38	57
7	43	60
8	46	62
9	50	65
10	53	67
11	55	69
12	57	71
13	59	72
14	61	73
15	62	74
16	63	75
17	64	76
18	65	77

[1] B Level reflects the minimum residual basal area after thinning. Thinning would only be considered where the basal area exceeds this level.

EXPLANATION OF COST DATA

A wide range of costs (the computer will accept 6 costs) was used to ensure that practically all conditions were covered. Initial and 10-year periodic costs used were $5, $20, $40, $60, $80, and $100. To avoid complicating the analysis any more than necessary, we assumed that if the initial cost per acre was $40, then each 10-year periodic cost per acre for managed stands was also $40. Actually each subsequent thinning operation will likely be less costly (or no cost if pulpwood or fuelwood products can be marketed) than the first, based on today's dollars. Thinnings later in the rotation will be less costly because there will be fewer stems to remove. This is especially true for regenerated stands. However, because of the inflationary effect on future costs we assumed that all subsequent thinnings would cost the same as the initial investment. A 10-cent annual cost per acre is included in our calculations for management costs, realizing this cost will not likely occur each year.

Ad valorem tax is not considered because this cost occurs whether or not the stand is managed. Land costs are not considered because the land should be considered a separate investment. Land usually appreciates in value at a rate equal to or greater than that of timber. Most landowners need to be informed of the alternative investment opportunities available on land already owned. This analysis will provide information for hardwood management.

FUTURE SELLING PRICE ASSUMPTION

Because costs in forestry occur early and returns occur many years later, it is only realistic to assume that historical increases in sawtimber will continue over the years, especially now that energy sources of any type will become more valuable. We have assumed that stumpage prices will increase at an 8 percent *simple* rate. This means that our assumption on a compounded rate would be much less than 8 percent (3.27 compound rate) and less than historical increases in sawtimber selling price increases since 1958. According to *An Analysis of the Timber Situation in the United States 1952-2030,* selling prices for oak sawtimber have increased at a 14 percent simple rate since 1958. Assumption of an 8 percent simple interest rate of stumpage increase is probably conservative; however, growing timber has some risks such as fire, insects, and diseases. In addition, the investor has a long wait for a return on the investment.

EXPLANATION OF YIELD DATA

Sound yield data for managed and unmanaged upland oak stands is basic for reaching sound conclusions. We adapted Gingrich's 1971 yield data for both managed and unmanaged upland oak stands (see tables 2,3,4,5,6,7,8 and 9). No values were given to fuelwood or pulpwood obtained from thinnings of managed stands. Also, no value was given to sawtimber volumes from thinnings unless the volume exceeded 1,000 board feet per acre. This means that the return on investments shown in this publication are conservative if market conditions improve for pulpwood and fuelwood in the future. Some of the 10-year periodic thinnings now shown as noncommercial would be commercial and substantially increase the rate of return and present net worth. This seems likely because fiber is a renewable energy source. However, no pulpwood or fuelwood values were considered to avoid being overly optimistic about the future.

Tables 2 through 9 project sawtimber yields for unmanaged and managed upland oak stands. Also included are examples showing how they were adapted to use in this analysis. Site index 85 yield data was extrapolated from Gingrich's yields on lower sites. Actual board foot yields from commercial thinnings and harvest cuts are shown in parentheses following cutting age at the bottom of each table for Internal Rate of Return (IRR), and Present Net Worth (PNW). The 1/4-inch International log rule is used throughout the analysis. The key to using this growth and yield data is the appraisal of stocking conditions and the use of subsequent cultural treatments to maximize growth and

Figure 1.—Relation of basal area, number of trees, and average tree diameter to stocking percent for upland central hardwoods. For average tree diameters 7 to 15, use the chart at left; for diameters 3 to 7, use the chart at right. (Average tree diameter is the diameter of the tree of average basal area.) *
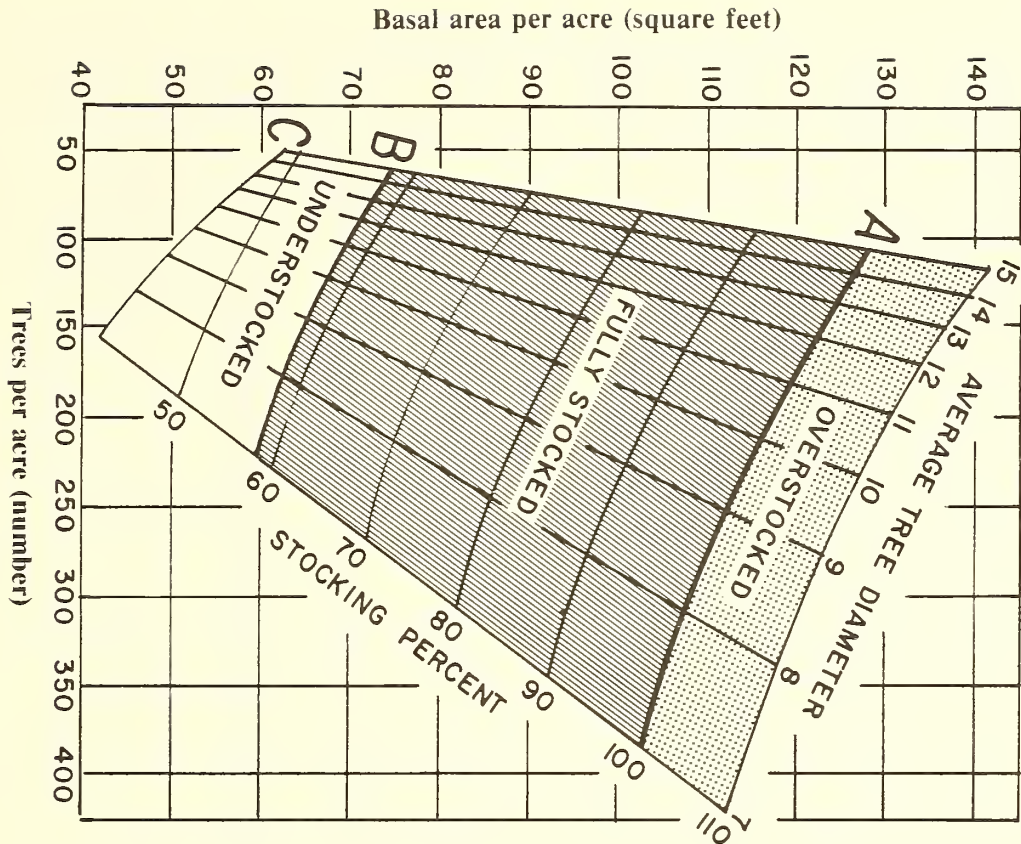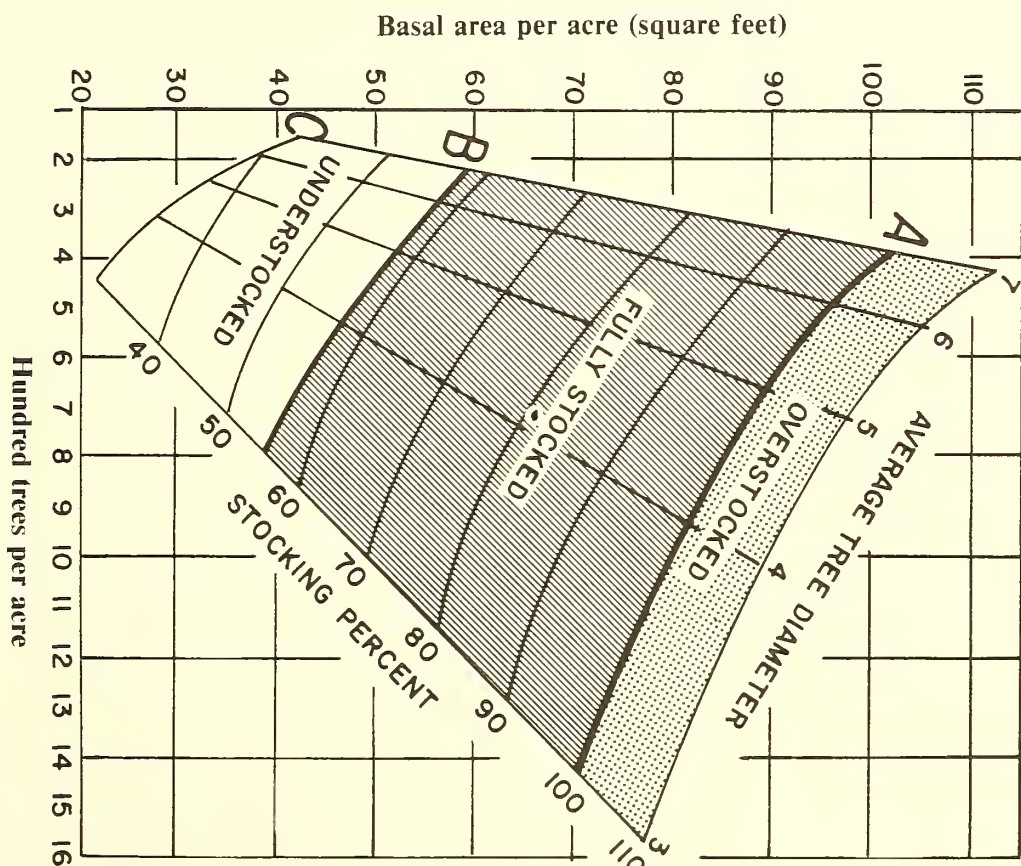
On both charts the area between curves A and B indicates the range of stocking where trees can fully utilize the site. Curve C shows the lower limit of stocking necessary to reach the B level in 10 years on average sites.

quality of growing stock trees and, thus, maximize rates of returns from investments. This depends on the skill of the user in classifying growing stock trees and stand conditions.

The standards used to determine growing stock trees are critical. Refer to Roach and Gingrich's 1968 discussion of tree classes. The time to begin thinning in young stands is also important because early investments must be carried for a long period. A 10-year thinning schedule was used for simplicity and because this thinning regime fits the yield data used (Gingrich, 1971). It is likely that on some sites a thinning schedule longer than 10 years would be more practical. As long as the thinning is performed on a silviculturally sound schedule resulting in an intensive management scheme, the effect on IRR and PNW should not be significant. Thinning should be delayed until trees capable of maintaining dominant or codominant crown positions can be identified in the stand. Research indicates that attempts to precommercially thin before this natural selection takes place usually result in wasted money and effort. This analysis assumes earliest thinnings at age 20.

Table 2.— Yields per acre for upland oak; no thinning

Age	Basal area	Trees	Average tree diameter[1]	Yields		
Years	Square feet	No.	Inches	Cubic feet	Cords	Board feet
SITE INDEX 55						
20	55	2,500	2.0	60	0.6	—
30	75	1,260	3.3	583	5.3	—
40	87	790	4.5	1,320	12.1	—
50	97	480	6.1	2,150	19.7	400
60	104	357	7.3	2,520	22.9	900
70	108	295	8.2	2,730	24.4	2,800
80	112	242	9.2	2,880	25.6	5,400
SITE INDEX 65						
20	59	1,880	2.4	178	1.6	—
30	81	930	4.0	1,200	10.6	—
40	96	505	5.9	1,840	18.2	440
50	105	342	7.5	2,800	26.9	2,150
60	111	262	8.8	3,300	30.8	5,160
70	115	215	9.9	3,700	33.3	7,200
80	117	187	10.7	3,950	35.6	8,200
SITE INDEX 75						
20	70	1,425	3.0	694	6.4	—
30	89	680	4.9	1,670	16.7	—
40	101	400	6.8	2,440	23.7	1,380
50	110	279	8.5	3,315	30.1	4,100
60	114	222	9.7	4,140	37.7	9,288
70	117	187	10.7	4,760	43.0	11,200
80	120	166	11.5	5,160	46.5	12,500

[1]The diameter of the tree of average basal area.

Table 3. — Yields per acre for upland oak. First thinning at age 10.

Age	Basal area	Average tree diameter	Yield			Basal area	Yield			Cumulative total yields (cut stand plus residual stand)		
years	Square feet	Inches	Cubic feet	Cords	Board feet	Square feet	Cubic feet	Cords	Board feet	Cubic feet	Cords	Board feet
					SITE INDEX 55							
10	20	1.9	---	---	---	--	---	---	---	---	---	---
20	48	4.1	515	5.0	---	7	25	---	---	540	5.0	---
30	58	5.9	1,190	9.9	240	20	345	4.2	---	1,560	14.1	240
40	64	8.0	1,640	15.0	1,560	19	350	3.6	160	2,360	22.8	1,720
50	71	10.6	1,990	18.3	3,800	16	415	4.4	590	3,125	30.5	4,550
60	75	13.0	2,280	20.7	6,540	16	485	4.9	1,050	3,900	37.8	8,340
					SITE INDEX 65							
10	23	2.1	---	---	---	--	---	---	---	---	---	---
20	51	4.5	775	6.8	---	8	125	1.2	---	900	8.0	---
30	59	6.4	1,445	13.1	540	25	370	3.8	---	1,940	18.1	540
40	66	8.6	1,920	18.0	2,280	21	465	3.8	280	2,880	26.8	2,560
50	72	11.0	2,340	21.8	5,250	19	575	5.2	970	3,875	35.8	6,500
60	76	13.7	2,655	24.3	8,940	18	670	5.8	1,810	4,860	44.1	12,000
					SITE INDEX 75							
10	25	2.5	----	---	---	---	---	---	---	---	---	---
20	55	5.4	1,060	9.6	---	12	200	1.6	---	1,260	11.2	---
30	62	7.4	1,920	17.5	1,380	30	520	5.2	60	2,640	24.3	1,440
40	71	10.5	2,550	23.0	4,840	22	610	5.6	500	3,880	35.4	5,400
50	75	13.2	3,025	26.8	10,300	22	745	6.8	1,540	5,100	46.0	12,400
60	78	15.5	3,360	29.7	13,200	21	925	7.8	3,540	6,360	56.7	18,840

Table header structure: Residual stand (Basal area, Average tree diameter, Yield); Cut stand (Basal area, Yield); Cumulative total yields (cut stand plus residual stand).

Table 4. — Yields per acre for upland oak. First thinning at age 20.

Age	Basal area	Average tree diameter	Yield			Basal area	Yield			Cumulative total yields (cut stand plus residual stand)		
years	Square feet	Inches	Cubic feet	Cords	Board feet	Square feet	Cubic feet	Cords	Board feet	Cubic feet	Cords	Board feet
					SITE INDEX 55							
20	34	2.3	60	0.6	---	--	---	---	---	60	0.6	---
30	49	4.2	600	5.1	---	15	---	0.9	---	600	6.0	---
40	58	6.1	1,220	12.2	880	16	300	2.9	---	1,520	16.0	880
50	66	8.6	1,750	16.0	2,350	15	300	3.2	150	2,350	23.0	2,500
60	71	10.6	1,980	18.6	3,960	15	360	3.2	570	2,940	28.8	4,680
70	74	12.1	2,170	20.0	5,810	14	370	3.8	820	3,500	34.0	7,350
					SITE INDEX 65							
20	37	2.8	160	1.6	---	--	18	---	---	178	1.6	---
30	50	4.6	750	7.4	---	20	132	1.2	---	900	8.6	---
40	63	7.7	1,760	16.0	1,320	15	290	3.2	---	2,200	20.4	1,320
50	69	9.8	2,150	19.7	3,500	19	625	4.1	400	3,215	28.2	3,900
60	73	12.0	2,460	22.5	6,120	18	515	4.4	1,160	4,040	35.4	7,680
70	77	14.6	2,730	24.2	9,030	16	520	4.9	2,010	4,830	42.0	12,600
					SITE INDEX 75							
20	46	3.6	476	4.4	---	--	218	2.0	---	694	6.4	---
30	57	5.6	1,275	13.0	---	26	307	3.6	---	1,800	18.6	---
40	66	8.4	2,140	19.8	2,160	21	535	4.8	240	3,200	30.2	2,400
50	71	10.8	2,600	24.7	6,450	21	665	5.4	1,160	4,325	40.5	7,850
60	76	13.4	3,060	28.5	10,680	19	615	4.9	2,020	5,400	49.2	14,100
70	79	16.3	3,465	31.5	13,720	19	635	5.2	2,740	6,440	57.4	19,880

Table 5. — *Yields per acre for upland oak. First thinning at age 30.*

Age		Residual stand					Cut stand				Cumulative total yields (cut stand plus residual stand)		
	Basal area	Average tree diameter		Yield		Basal area		Yield					
years	*Square feet*	*Inches*	*Cubic feet*	*Cords*	*Board feet*	*Square feet*	*Cubic feet*	*Cords*	*Board feet*	*Cubic feet*	*Cords*	*Board feet*
						SITE INDEX 55							
30	58	4.3	528	4.8	---	17	55	0.5	---	583	5.3	---
40	55	5.7	1,120	9.4	200	27	265	3.1	---	1,440	13.0	200
50	62	7.8	1,600	14.2	1,500	15	330	3.4	---	2,250	21.2	1,500
60	67	10.2	1,950	17.4	3,000	15	310	3.2	360	2,910	27.6	3,360
70	72	11.7	2,135	19.6	5,040	12	335	3.1	550	3,430	32.9	5,950
80	75	13.0	2,280	20.6	8,000	12	345	3.7	1,010	3,920	37.6	9,920
						SITE INDEX 65							
30	62	4.9	1,120	9.6	---	20	80	1.0	---	1,200	10.6	---
40	60	6.6	1,520	13.6	640	29	400	3.8	---	2,000	18.4	640
50	67	9.0	2,000	18.5	2,450	18	470	4.2	---	2,950	27.5	2,450
60	72	11.2	2,370	21.5	4,620	17	430	3.9	600	3,750	34.5	5,220
70	76	13.7	2,660	23.8	8,320	16	440	3.9	1,510	4,480	40.6	10,430
80	78	16.1	2,880	24.8	10,900	16	460	4.0	2,510	5,160	45.6	15,520
						SITE INDEX 75							
30	66	5.5	1,450	14.0	---	23	220	2.7	---	1,670	16.7	---
40	62	7.1	1,840	17.0	1,400	34	600	5.5	---	2,660	25.2	1,400
50	68	9.7	2,400	22.8	4,200	20	555	5.0	650	3,775	36.0	4,850
60	73	12.4	2,880	26.7	7,980	19	515	4.8	1,450	4,770	44.7	10,080
70	77	15.2	3,325	29.8	13,020	17	490	4.4	2,100	5,705	52.2	17,220
80	80	17.7	3,760	31.6	15,440	16	500	4.8	3,400	6,640	58.8	23,040

Table 6. — Yields per acre for upland oak. First thinning at age 40.

Age	Residual stand					Cut stand				Cumulative total yields (cut stand plus residual stand)		
	Basal area	Average tree diameter	Yield			Basal area	Yield					
years	Square feet	Inches	Cubic feet	Cords	Board feet	Square feet	Cubic feet	Cords	Board feet	Cubic feet	Cords	Board feet
					SITE INDEX 55							
40	63	5.0	1,140	10.5	---	24	180	1.6	---	1,320	12.1	---
50	62	7.4	1,538	13.0	900	23	282	3.4	---	2,000	18.0	900
60	67	9.1	1,830	15.6	2,430	15	288	3.1	270	2,580	23.7	2,700
70	72	11.0	2,065	18.6	4,445	12	300	2.7	465	3,115	29.4	5,180
80	74	12.7	2,240	21.6	6,880	12	350	2.8	865	3,640	35.2	8,480
90	76	13.8	2,430	24.8	9,180	9	355	3.0	1,100	4,185	41.4	11,880
					SITE INDEX 65							
40	69	6.5	1,600	15.9	440	27	240	2.3	---	1,840	18.2	440
50	66	8.5	1,910	17.7	1,800	28	410	4.0	200	2,560	24.0	2,000
60	70	10.4	2,200	20.7	4,200	18	400	3.6	280	3,270	30.6	4,680
70	74	12.4	2,485	23.1	7,210	16	420	3.7	710	3,955	36.7	8,400
80	77	14.5	2,720	24.8	8,960	15	410	4.0	1,050	4,600	42.4	11,200
90	79	16.5	2,925	26.6	10,710	13	460	4.0	1,630	5,265	48.2	14,580
					SITE INDEX 75							
40	73	7.4	2,130	20.2	1,380	28	300	3.0	---	2,440	23.2	1,380
50	68	9.6	2,390	21.8	3,450	31	635	6.2	300	3,325	31.0	3,750
60	73	11.6	2,730	24.9	7,680	19	625	5.2	1,020	4,290	39.3	9,000
70	76	13.8	3,115	28.0	11,200	19	610	4.8	1,620	5,285	47.2	14,140
80	79	16.5	3,480	30.8	14,080	17	590	5.2	2,340	6,240	55.2	19,360
90	81	18.7	3,735	33.7	15,840	15	660	5.3	3,000	7,155	63.4	24,120

Table 7. — Yields per acre for upland oak. First thinning at age 50.

Age	Residual stand					Cut stand				Cumulative total yields (cut stand plus residual stand)		
	Basal area	Average tree diameter	Yield			Basal area	Yield					
years	Square feet	Inches	Cubic feet	Cords	Board feet	Square feet	Cubic feet	Cords	Board feet	Cubic feet	Cords	Board feet
					SITE INDEX 55							
50	69	6.5	1,627	14.9	400	28	523	4.8	---	2,150	19.7	400
60	66	8.4	1,710	14.7	1,350	23	317	3.9	150	2,550	23.4	1,500
70	68	9.3	1,855	15.4	3,585	15	280	3.2	165	2,975	27.3	3,900
80	71	10.5	1,960	18.0	6,160	12	280	2.1	325	3,360	32.0	6,800
90	73	11.5	2.115	20.0	8,240	10	220	2.2	620	3,735	36.2	9,500
100	74	12.7	2,250	22.8	8,900	9	230	1.5	1,240	4,100	40.5	11,400
					SITE INDEX 65							
50	75	8.0	2,130	19.6	1,850	30	670	7.3	300	2,800	26.9	2,150
60	68	9.6	2,130	19.5	4,090	29	470	4.4	210	3,270	31.2	4,600
70	70	10.4	2,240	20.6	6,160	18	400	3.7	330	3,780	36.0	7,000
80	74	12.2	2,480	22.8	8,240	14	300	2.6	520	4,320	40.8	9,600
90	77	14.8	2,745	25.2	10,305	12	275	2.7	935	4,860	45.9	12,600
100	79	17.0	3,000	28.5	10,700	10	235	1.8	1,905	5,350	51.0	14,900
					SITE INDEX 75							
50	78	9.0	2,590	24.4	3,650	32	725	5.7	450	3,315	30.1	4,100
60	72	11.3	2,700	25.2	6,300	30	655	6.8	1,050	4,080	37.7	7,800
70	75	12.8	2,965	26.8	9,200	19	475	5.2	1,100	4,820	44.5	11,800
80	77	14.1	3,180	29.0	11,500	18	425	4.8	1,500	5,460	51.5	15,600
90	79	16.5	3,620	31.4	13,000	16	420	4.6	1,900	6.320	58.5	19,000
100	81	18.4	3,880	33.0	14,450	14	500	4.9	2,750	7,080	65.0	23,200

Table 8.—An example of sawtimber yields per acre from intensive management on an existing stand. Site index of 75, rotation age 70, first thinning at age 20.

Stand Age	Years from initial investment	Residual MBF	Cut MBF comm.	Cut MBF noncomm.	Cumulative total yield (MBF)
20	0	—	—	—	—
30	10	—	—	—	—
40	20	2,160	—	240*	2,400
50	30	6,450	1,160	—	7,850
60	40	10,680	2,020	—	14,100
70	50	—	16,460†	—	19,880

† Harvest cut at rotation age
* 1,000 board feet per acre considered the minimum merchantable volume.

Table 9.—An example of per acre sawtimber yields from intensive management on a regenerated stand. Site index of 75, rotation age 60, first thinning at age 30.

Stand Age	Years from initial investment	Residual MBF	Cut MBF comm.	Cut MBF noncomm.	Cumulative total yield (MBF)
0	0	—	—	—	—
10	10	—	—	—	—
20	20	—	—	—	—
30	30	—	—	—	—
40	40	1,400	—	—	1,400
50	50	4,200	—	650*	4,850
60	60	—	9,430†	—	10,080

† Harvest cut at rotation age.
* 1,000 board feet per acre was considered the minimum merchantable volume.

All existing stands with site indexes of 55, 65, and 75 were carried five cutting cycles or 50 years from the time of the first thinning. Options were extended for intensive management on existing stands with a site index of 85 to accommodate the better growing conditions and more favorable financial opportunities on these sites.

QUALITY INDEX

In many cases, the average selling price that the forester or landowner uses to look up the rate of return is for smaller size—or poor quality stems because of past highgrading. However, the average selling price in the area would be much higher for larger, high quality timber. Therefore, a quality index increase is built into the program to reflect a premium for quality because of management. When the yield data used indicates an average diameter at breast height (dbh) of 14 inches or greater, a quality index of 1.2 is used for harvest cuts. This means that the computer would substitute $120 per thousand board feet for the selling price instead of $100. When the average diameter is over 17 inches, a quality index of 2.0 is used for harvest cuts. A quality index of 2.0 only applied to timber on land having a site index of 85 for a rotation length of 60 years or longer.

METHOD OF DETERMINING RETURN ON INVESTMENT

Because of the numerous calculations necessary to make an investment analysis of upland hardwood stands, the PAR-3 computer program was used for this task. This program is a modification by Balmer, Steber and Utz of the investment analysis program developed by Row (1962).

PAR-3 develops present net worth for six interest rates simultaneously for six alternatives. The program also calculates the internal rate of return for each alternative. In addition, PAR-3 calculates annual equivalent incomes for each of the six rates of interest for each alternative.

The variables are:
1. Yields for up to three different products
2. Year of periodic costs and product returns
3. Annual costs
4. Annual increase in annual costs (simple interest)
5. Product prices
6. Annual change in product price (simple interest)

7. Final values.

Rate-of-return and present net worth are the two measures of return on investment that will be used for this analysis. A brief description of each follows:

Present Net Worth (PNW) is the difference between the present value of all cost (present and future) and income at a given interest. A positive PNW indicates that the investment furnishes a higher return than the selected interest rate. A PNW of zero indicates an investment that is just equaling the selected rate. The selected interest rate indicates the investors minimum objective or alternative investment opportunity.

Rate of Return (sometimes referred to as internal rate of return) is the compound interest rate used where the present net worth is zero. In other words, the rate of return is the compound interest rate that equates the present value of all future costs. It is assumed that all incomes can be reinvested at the same rate of return.

RESULTS OF INVESTMENT ANALYSIS

Results of this investment analysis indicate that there are many circumstances where hardwood management provides a high rate of return on the investment. In fact, the results will surprise many foresters. Some of the most significant findings of this analysis are:

- Returns on managed existing stands are much higher than those on regenerated because of the "free" existing volume build-up during previous years at no cost. A 11.9-percent return may be obtained on an existing stand and an 8.7 percent return on a regenerated stand, under these conditions: the timber is on land having a site index of 75, is managed on a 70-year rotation with first thinning in 20 years, $40 initial and 10-year periodic costs, with $100 per thousand board feet selling price.
- Managing existing well-stocked stands provides a unique opportunity to increase dramatically the PNW at 8 percent on each acre. For an unmanaged existing stand the

PNW is only $15 per acre under the following conditions: a fully stocked stand, selling price $100 per thousand board feet, site index 75, and rotation age 80. In contrast, the same stand would have a PNW of $261 under managed conditions with thinnings beginning at age 30 and periodic 10-year costs of $40 per acre on an 80 year rotation.

- The IRR and PNW is higher for managed existing stands when the first thinning is at age 40 and decreases as the first thinning age decreases. For regenerated stands, however, the reverse is true. The IRR and PNW is higher when the first thinning occurs at an early age. However, the owner of a 20-year-old existing stand need not wait until the trees reach age 40 before making the first thinning because that would pass up 20 years of the high return on thinning the 20-year-old stand. The higher rate of return on the first thinning at age 40 would not come close to making up for the 20 years of lost opportunity for a high return on investment.
- Stands grown on land having a site index of 55 generally do not provide an adequate return on investment for regenerated stands and rarely provide an adequate return on managing existing stands.
- The age of first thinning for existing stands has a more significant effect on the return on the investment than does rotation age. However, there is less control over age of the first thinning than for rotation age because the age of first thinning may be determined only by the time of purchase. A good investment strategy would be to locate existing stands of 30 to 40 years of age with adequate stocking of desirable stems. The PNW at 8 percent will give a good idea of the amount one could pay per acre for the tract. Unfortunately, very few stands of this quality exist because of past mismanagement.

The following summary (tables 10 and 11) provides an internal rate of return for managed, existing and regenerated stands for $40 per acre initial and 10-year periodic cost and $100 per thousand board feet selling price.

Table 10.—Internal rate of return on managed existing stands.			
Site index	Rotation length	First thinning age	Internal rate of return
Feet	..... Years.....		Percent
55	70	20	7.8
55	80	30	8.6
65	70	20	10.1
65	80	30	10.6
75	70	20	11.9
75	80	30	13.2
75	90	40	14.6
85	40	20	16.6
85	50	20	15.8
85	60	20	14.9
85	70	20	14.2
85	50	30	20.8
85	60	30	18.6
85	70	30	17.4
85	80	30	15.7
85	60	40	23.9
85	70	40	20.0
85	80	40	18.6
85	90	40	17.0

Table 11.—Internal rate of return on regenerated stands.			
Site index	Rotation length	First thinning age	Internal rate of return
Feet	..... Years.....		Percent
55	60	20	6.3
55	70	20	6.1
55	60	30	6.1
55	70	30	6.1
55	80	30	6.1
65	60	20	7.3
65	70	20	7.6
65	60	30	7.0
65	70	30	7.4
65	80	30	7.2
65	60	40	6.9
65	70	40	6.9
65	80	40	6.7
75	50	20	8.9
75	60	20	9.2
75	70	20	8.7
75	50	30	8.2
75	60	30	8.2
75	70	30	8.4
75	80	30	8.1
75	60	40	8.2
75	70	40	8.2
75	80	40	7.9
85	40	20	9.2
85	50	20	10.1
85	60	20	10.3
85	70	20	10.2
85	50	30	7.8
85	60	30	9.8
85	70	30	10.0
85	80	30	9.3
85	50	40	9.0
85	60	40	9.2
85	70	40	9.0
85	80	40	9.2
85	90	40	8.7

SENSITIVITY ANALYSIS

You can readily determine the impact on most of the many variables in this analysis by comparing between the tables and within each table. The tables illustrating internal rate of return and present net worth at 8 percent show the variation in the rate of return if the 10-year initial and periodic cost are different than expected. The most important variable on the rate of return is the initial cost, and because this cost occurs now at year zero, this cost can be determined very accurately. The impact of a different stumpage price than expected can be easily determined within each table. You can also compare easily the impact of the site index on the rate of return.

The impact of any variation in the fixed assumptions which are common to all situations are not illustrated in the tables.

One fixed assumption concerning the future wherein the tables show no alternative option is the 8-percent *simple* interest increase in stumpage. As mentioned earlier, this is a conservative estimate of stumpage price increases. Sawtimber volumes for managed conditions were obtained from the best sources available; however, it would be interesting to see what impact a 30 percent decrease in assumed volume would have on the rate of return. An increased annual management cost is another variable that could be measured for its impact on the rate of return. Finally, the worst condition possible would be where all of the above situations developed, and if the rate of return is still adequate, then the investor could be assured of receiving at least this rate of return, realizing that the possibility of all negatives occurring at once would be rare.

Tables 13, 14, 15 and 16 illustrate the consequences of all the deviations from the fixed assumptions described above on the tables in the appendix. Table 12 serves as a control and represents the assumptions used throughout this publication. The following conditions are common for all of the five following tables:

—Site 75
—Regenerated stand
—50 year rotation
—First thinning at age 30

To illustrate the specific variations from the control table (12), $100 stumpage price and $40 initial and 10-year period cost are used for the comparisons.

Table 12 (control) assumes an 8 percent annual interest increase in stumpage prices; no decrease in volume and no increase in the 10-cent per acre annual management cost. For $100 stumpage and $40 initial and 10-year periodic cost, the internal rate of return is 8.2 percent.

Table 13 shows the impact of reducing the volume yield by 30 percent. The internal rate of return is reduced to 7.3 percent.

Table 14 shows the result of reducing the stumpage price increase from an 8 percent annual increase (simple) to 5 percent. The internal rate of return is 7.3 percent under this assumption.

Table 15 illustrates the impact of inceasing the annual management cost from 10 cents per acre to $1 per acre. The internal rate of return is 7.2 percent.

Finally, table 16 shows the combined impact of all the above factors. As could be expected, the internal rate of return is reduced significantly to a 5.5 percent rate of return. This is a reduction of 2.7 percent in the rate of return on the control table (table 12).

Because it is unlikely that *all* of the above deviations in fixed variables would occur, one can see that the internal rate of return would not likely differ more than 1 percent from that shown on the tables in the appendix. It is just as likely that some of the fixed assumptions could be *more* favorable than those assumed in the analysis, and a higher rate of return would be realized than those shown in the appendix.

Table 12.—Control

Internal rate of return on Site 75, regenerated stand managed on a 50-year rotation, first thinning at age 30

Selling price in dollars per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	----------------Percent----------------					
50	10.9	8.1	6.5	5.5	4.8	4.2
100	12.6	9.7	8.2	7.2	6.6	6.0
150	13.6	10.7	9.1	8.2	7.5	7.0
200	14.3	11.3	9.8	8.9	8.2	7.7
250	14.8	11.9	10.3	9.4	8.8	8.2
300	15.2	12.3	10.7	9.8	9.2	8.7
350	15.6	12.7	11.1	10.2	9.5	9.0
400	15.9	13.0	11.4	10.5	9.9	9.3
450	16.2	13.3	11.7	10.8	10.2	9.6
500	16.5	13.5	11.9	11.0	10.4	9.9
1,000	18.1	15.1	13.5	12.6	12.0	11.5

Table 13—Yield reduced 30 percent

Internal rate of return on Site 75, regenerated stand managed on a 50-year rotation, first thinning at age 30.

Selling price in dollars per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	----------------Percent----------------					
50	10.0	7.2	5.6	4.6	3.9	3.2
100	11.7	8.9	7.3	6.4	5.7	5.1
150	12.7	9.8	8.3	7.4	6.7	6.1
200	13.4	10.5	9.0	8.1	7.4	6.9
250	13.9	11.0	9.5	8.6	7.9	7.4
300	14.4	11.5	9.9	9.0	8.3	7.8
350	14.7	11.8	10.3	9.4	8.7	8.2
400	15.1	12.1	10.6	9.7	9.0	8.5
450	15.3	12.4	10.9	9.9	9.3	8.8
500	15.6	12.7	11.1	10.2	9.5	9.0
1,000	17.3	14.3	12.7	11.8	11.1	10.6

Table 14.—Stumpage price increase of only 5 percent simple interest per year

Internal rate of return on Site 75, regenerated stand managed on a 50-year rotation, first thinning at age 30

Selling price in dollars per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	----------------Percent----------------					
50	10.1	7.2	5.6	4.6	3.9	3.3
100	11.8	8.9	7.3	6.4	5.7	5.1
150	12.8	9.9	8.3	7.4	6.7	6.2
200	13.5	10.5	9.0	8.1	7.4	6.9
250	14.0	11.1	9.5	8.6	7.9	7.4
300	14.4	11.5	9.9	9.0	8.3	7.8
350	14.8	11.8	10.3	9.4	8.7	8.2
400	15.1	12.1	10.6	9.7	9.0	8.5
450	15.4	12.4	10.9	10.0	9.3	8.8
500	15.7	12.7	11.1	10.2	9.5	9.0
1,000	17.3	14.3	12.7	11.8	11.1	10.7

Table 15.—Annual Cost of $1 per acre per year

Internal rate of return on Site 75, regenerated stand managed on a 50-year rotation, first thinning at age 30

Selling price in dollars per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	----------------Percent----------------					
50	7.6	6.3	5.3	4.6	4.0	3.5
100	9.7	8.3	7.2	6.5	5.9	5.5
150	10.9	9.4	8.3	7.6	7.0	6.5
200	11.7	10.1	9.0	8.3	7.7	7.3
250	12.3	10.7	9.6	8.9	8.3	7.8
300	12.8	11.2	10.1	9.3	8.7	8.3
350	13.2	11.6	10.4	9.7	9.1	8.7
400	13.6	11.9	10.8	10.0	9.5	9.0
450	13.9	12.2	11.1	10.3	9.7	9.3
500	14.2	12.5	11.3	10.5	10.0	9.5
1,000	16.0	14.2	13.0	12.2	11.7	11.2

Table 16.—*Yield reduced 30 percent, stumpage price increased 5 percent annually; $1 annual cost*

Internal rate of return on Site 75, regenerated stand managed on a 50-year rotation, first thinning at age 30.

Selling price in dollars per MBF	Initial and 10-year periodic cost					
	Dollars					
	5	20	40	60	80	100
	Percent					
50	5.9	4.6	3.4	2.6	2.0	1.4
100	8.1	6.6	5.5	4.7	4.1	3.6
150	9.2	7.7	6.6	5.8	5.3	4.8
200	10.0	8.5	7.4	6.6	6.0	5.5
250	10.7	9.1	7.9	7.2	6.6	6.1
300	11.1	9.5	8.4	7.6	7.1	6.6
350	11.6	9.9	8.8	8.0	7.5	7.0
400	11.9	10.3	9.1	8.4	7.8	7.3
450	12.3	10.6	9.4	8.7	8.1	7.6
500	12.5	10.9	9.7	8.9	8.3	7.9
1,000	14.4	12.6	11.4	10.6	10.0	9.5

COMPARISON OF ALTERNATIVE INVESTMENTS

When comparing rates of return for existing stands with alternative investment opportunities, remember that the rates shown on the tables include the existing volume plus management costs and not the return from the improvement cost alone. For example, tables 26 and 27 show a rate of return of 10.5 percent and a present net worth of $263, at 8 percent, for an existing stand under these conditions: site index of 75, 70-year rotation, first thinning at age 20, $100 initial and periodic costs, and a $150 selling price. However, the unmanaged, fully stocked stand provides a yield of 11,200 board feet at rotation age 70 (table 2) with no initial and periodic cost under these conditions: site index of 75, 70-year rotation (table 17 shows the PNW for an 80-year rotation only), and a $150 selling price. The managed, existing stand provides a yield of 1,160 board feet at age 50, 2,020 board feet at age 60, and 16,460 board feet at age 70 final harvest, but with a cost of $100 at age 20, 30, and 40 years.

Let's assume that the forest landowner invested the same $100 noted in the previous example for timber at age 20, 30 and 40 years at a bank, with a yield of 8 percent, instead of investing it in the management of a hardwood stand. The owner would still receive the yield from the unmanaged stand when it reaches age 70, plus interest on the invested money in the bank.

Which investment provides a higher rate of return: the unmanaged stand with a disposable income of $100 at age 20, 30 and 40 years invested in the bank at 8 percent, or the same amount of money invested in managing a hardwood stand? To answer this question, we must consider the real world of the net return after taxes. For example, take the situation of the forest landowner in the 40 percent tax bracket. Each $100 invested returned $40 to this taxpayer that year because this cost is an itemized deduction. Therefore, this $40 can be invested. Also, the returns from timber harvested qualify for capital gains—60 percent of the return is excluded from the Federal tax. Because the managed stand generates a higher timber volume, this tax benefit favors the managed stand. In contrast, the returns from the money invested in the bank are all taxed at the ordinary rate. The following evaluation compares each option.

Return on an Unmanaged Stand with Three $100 Investments in Bank at 8 Percent Interest

Earnings from Bank Interest

First $100 invested for 50 years, compounded at 8 percent $4,690

Second $100 invested for 40 years, compounded at 8 percent 2,172

Third $100 invested for 30 years, compounded at 8 percent 1,006

$7,868

Earnings from Timber

The yield from an unmanaged stand, site index 75, after 70 years equals 11,200 board feet.

The price obtained for this timber is calculated as follows. Assume a current selling price of $150, an 8-percent, simple interest rate, and a 50-year investment period. The selling price would be:

0.08 × $150 = $12
$12 × 50 years = $600
$600 + $150 = $750 selling price
per thousand board feet

Timber earnings are computed as follows:
11,200 board feet × $750 = $8,400

Total Net Income After Tax

Net income from bank interest
(60 percent of $7,868) $4,720
60 percent of timber income
excluded from taxes $5,040
Remaining timber income after exclusion ($3,360) is taxed at 40 percent, so 60 percent × $3,360 equals $2,016

Total net income after Federal
taxes $11,776

Return on Managed Stand with Three $40 Investments in Bank at 8 Percent Interest

Earnings from Bank Interest

First $40 invested for 50 years,
compounded at 8 percent $1,876
Second $40 invested for 40 years,
compounded at 8 percent   869
Third $40 invested for 20 years,
compounded at 8 percent   402

Total $3,147

Earnings from Timber

The yield from a managed stand, site index 75, after 70 years is shown at three periods. The investment begins with the stand at age 20.

Year 50: Thin 1,160 thousand board
feet, at $510 selling price .... $ 592
Year 60: Thin 2,020 thousand board
feet, $630 selling price 1,273
Year 70: Harvest cut of 16,460
thousand board feet, at $750 selling
price 12,345

Total $14,210

Total Net Income After Tax

Net income from bank interest
(60 percent of $3,147) .... $ 1,888
60 percent of timber income
excluded from taxes 8,526
Net on remaining timber income
(60 percent × $5,684) 3,410

Total net income after Federal
taxes $13,824

Comparisons of these two options show that the managed stand option yields $2,048 more income after taxes than the unmanaged option, at the end of 50 years. The same exercise was calculated for site index 65, with other conditions remaining the same. In this case, the two options were about equal. The calculations for these two options include all significant considerations. More refining of some of the numbers would be of limited value as it would not significantly affect the end result. Remember, the highest cost figure of $100 was used in the calculations. In existing stands, the initial and periodic cost would likely be less than $100.

In general, it appears that the managed stands for site index 75 and higher clearly yield a higher rate of return, net after taxes, than the unmanaged stands. Investments on site index 65 could go either way, and site index 55 would likely be a poor investment. If selling prices increase faster than the assumed 3.27 percent compound rate, the managed option for site index 65 would clearly yield a higher rate than the unmanaged option.

The tables in the appendix do not reflect these calculations for obvious reasons. However, based on these computations, one could generalize that any rate of return over 10 percent, in the existing-stand tables, would indicate that the managed situation would yield a higher rate of return than the unmanaged option. The calculations for site index 75, table 26, showed a 10.5 percent rate of return and clearly exceeded the return from the unmanaged option. The rate of return for site index 65, under management, was 8.8 percent—and the two options were about equal.

This type of evaluation is not necessary on

the regenerated stands because the existing stand was understocked to the extent that yields from the unmanaged stand would be insignificant.

CONCLUSION

Current conditions of nearly all unmanaged, highgraded, existing stands do not reflect the potential that exists under managed conditions with 10-year noncommercial or commercial thinnings. The greatest opportunity exists where presently overstocked stands occur with an adequate number of desirable stems. Because of the existing volume growth at no cost, the rate of return from initiating the management at this point is usually quite high. These favorable stocking conditions are not common, but the next option—regenerating inadequately stocked stands—provides a good rate of return on the higher sites (75 and 85) and a poor or marginal return on the lower sites based on $100 per thousand board feet selling price and $40 initial and periodic 10-year costs. Higher stumpage prices may yield a good rate of return on even the lower site conditions.

Readers should also consider the tax advantages of growing timber.[1] Proceeds from selling a timber crop can qualify as a capital gain, which is a significant tax advantage over ordinary income. The magnitude of this advantage depends on the investor's tax bracket and other factors; however, it would be significant in all cases. Passage of PL-96-451 in 1980 also increases the tax advantages for regenerated stands because it provides a 10-percent investment tax credit and allows amortizing regeneration costs over 7 years.

Based on this analysis, it seems that there are more good opportunities available for managing hardwood stands than may be realized by foresters and forestland owners.

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[1]Read *Many Landowner's Pay Too Much Income Tax: Do You,* General Report SA-GR-18, and *Forestry as an Investment in the South,* General Report SA-GR-20. Copies are available from the authors.

APPENDICES

EXPLANATION OF TABLES IN THE APPENDICES

The figures on treatment costs, product values, site quality, rotation age, and initial management age cover a wide range of variability, and are spread among a large number of tables. To save time in reviewing the tables in the appendices, note that they are organized as a directory; you may quickly refer to only those tables that apply to a situation of specific interest to you.

Table 17 shows *current* selling prices for upland oak in the left column and present net worth at 8 percent for site indexes 55, 65 and 75 in the next three columns, opposite the corresponding selling prices.

Appendixes B and C pertain to managed, existing and regenerated stands, respectively. In these appendixes, tables 18 through 127 show the 10-year periodic costs across the top, below the heading. The six costs used in this analysis are $5, $20, $40, $60, $80, and $100 per acre. For regenerated stands (tables 56 through 127) the heading represents the initial regeneration cost at year 0, and the 10-year interval noncommercial thinning costs. For existing stands (tables 18 through 55) these costs represent the initial noncommercial thinning and subsequent 10-year interval noncommercial thinnings. The vertical column on the left side of each table shows the *current* selling prices per thousand board feet ranging from $50 to $500, in $50 intervals and $1,000 per thousand board feet to cover any likely situation. Ages at which thinnings and harvest cuts occur and corresponding sawtimber volumes are shown at the bottom of each table. Figures in the body of each table show internal rate of return or present net worth at 8 percent for that particular situation.

Tables 18 through 55 illustrate the internal rate of return and present net worth at 8 percent for managed existing stands. The tables on the left side of the page show internal rate of return and the tables on the right side of the page show the present net worth at 8 percent.

Tables 56 through 127 illustrate the internal rate of return and present net worth for regenerated stands. These tables are illustrated in the same manner as for managed existing stands.

The residual basal area figure at the top of each table for managed existing stands is a target basal area objective for providing optimum growing space for each tree, while still maintaining full site utilization. Thinnings should not reduce stands below this level of stocking.

APPENDIX A.
Existing Stand Without Management

Table 17.—Present net worth at 8 percent of unmanaged existing stands of upland oak on land having site indexes of 55, 65, and 75, and grown on an 80-year rotation.

Current selling price in dollars per MBF*	Present net worth		
	Site 55	Site 65	Site 75
	dollars per acre		
50	--	2	5
100	4	8	15
150	8	15	25
200	12	21	35
250	17	28	45
300	21	34	54
350	25	41	64
400	29	47	74
450	34	53	84
500	38	60	94
1,000	80	124	192

*Stumpage prices are assumed to increase at an 8 percent simple rate.

APPENDIX B.
Existing Stands With Management

EXISTING STANDS

Site Index: 55
Rotation Age: 70

Internal Rate of Return

Table 18.—First thinning at age 20,
residual basal area 34.

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	10.9	7.8	6.0	5.0	4.2	3.6
100	12.7	9.5	7.8	6.8	6.1	5.5
150	13.7	10.5	8.9	7.9	7.1	6.6
200	14.4	11.3	9.6	8.6	7.9	7.3
250	15.0	11.8	10.2	9.2	8.5	7.9
300	15.5	12.3	10.6	9.6	8.9	8.4
350	15.8	12.7	11.0	10.0	9.3	8.7
400	16.2	13.0	11.3	10.3	9.6	9.1
450	16.5	13.3	11.6	10.6	9.9	9.4
500	16.7	13.5	11.9	10.9	10.2	9.6
1,000	18.5	15.3	13.6	12.6	11.9	11.4

Noncommercial thinning at age 20, 30, 40, 50, 60; harvest cut at age 70 (6.6 MBF).

Present Net Worth at 8 Percent

Table 19.—First thinning at age 20,
residual basal area 34.

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	24	---	---	---	---	---
100	59	32	---	---	---	---
150	95	67	31	---	---	---
200	130	103	66	30	---	---
250	165	138	101	65	29	---
300	201	173	137	100	64	27
350	236	209	172	136	99	63
400	271	244	207	171	134	98
450	307	279	243	206	170	133
500	342	315	278	242	205	169
1,000	695	668	632	595	559	522

Noncommercial thinning at age 20, 30, 40, 50, 60; harvest cut at age 70 (6.6 MBF).

Site Index: 55
Rotation Age: 80

Internal Rate of Return

Table 20.—First thinning at age 30,
residual basal area 58.

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	11.7	8.5	6.8	5.8	5.1	4.5
100	13.5	10.3	8.6	7.6	6.9	6.3
150	14.5	11.3	9.7	8.7	7.9	7.4
200	15.2	12.0	10.4	9.4	8.7	8.1
250	15.8	12.6	10.9	9.9	9.2	8.7
300	16.2	13.0	11.4	10.4	9.7	9.1
350	16.6	13.4	11.8	10.8	10.1	9.5
400	16.9	13.7	12.1	11.1	10.4	9.9
450	17.2	14.0	12.4	11.4	10.7	10.1
500	17.5	14.3	12.6	11.7	10.9	10.4
1,000	19.3	16.0	14.3	13.4	12.7	12.1

Noncommercial thinning at age 30, 40, 50, 60, 70; harvest cut at age 80 (9.0 MBF).

Present Net Worth at 8 Percent

Table 21.—First thinning at age 30,
residual basal area 58.

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	37	9	---	---	---	---
100	85	57	21	---	---	---
150	133	105	69	32	---	---
200	181	153	117	80	44	7
250	229	201	165	128	92	55
300	277	249	213	176	140	104
350	325	297	261	224	188	151
400	373	345	309	272	236	200
450	421	393	357	321	284	248
500	469	441	405	369	332	296
1,000	949	922	885	849	812	776

Noncommercial thinning at age 30, 40, 50, 60, 70; harvest cut at age 80 (9.0 MBF).

Site Index: 65
Rotation Age: 70

Internal Rate of Return

Present Net Worth at 8 Percent

Table 22.—First thinning at age 20, residual basal area 37

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	13.3	10.0	8.3	7.3	6.5	5.9
100	15.1	11.8	10.1	9.1	8.3	7.7
150	16.2	12.8	11.1	10.1	9.4	8.8
200	16.9	13.6	11.9	10.8	10.1	9.5
250	17.5	14.1	12.4	11.4	10.7	10.1
300	18.0	14.6	12.9	11.9	11.1	10.6
350	18.4	15.0	13.3	12.3	11.5	11.0
400	18.8	15.4	13.6	12.6	11.9	11.3
450	19.1	15.7	13.9	12.9	12.2	11.6
500	19.4	15.9	14.2	13.2	12.5	11.9
1,000	21.3	17.8	16.0	15.0	14.2	13.7

Noncommercial thinning at age 20, 30, 40, 50; commercial thinning at age 60 (1.2 MBF); harvest cut at age 70 (11.0 MBF).

Table 23.—First thinning at age 20, residual basal area 37

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	71	44	8	---	---	---
100	152	126	90	55	19	---
150	234	208	172	137	101	65
200	316	289	254	218	183	147
250	398	371	336	300	265	229
300	480	453	418	382	346	311
350	562	535	499	464	428	393
400	643	617	581	546	510	475
450	725	699	663	627	592	556
500	807	780	745	709	674	638
1,000	1,625	1,599	1,563	1,528	1,492	1,457

Noncommercial thinning at age 20, 30, 40, 50; commercial thinning at age 60 (1.2 MBF); harvest cut at age 70 (11.0 MBF).

Site Index: 65
Rotation Age: 80

Internal Rate of Return

Present Net Worth at 8 Percent

Table 24.—First thinning at age 30, residual basal area 62

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	13.8	10.5	8.8	7.8	7.1	6.5
100	15.7	12.3	10.6	9.6	8.9	8.3
150	16.7	13.4	11.6	10.6	9.9	9.3
200	17.5	14.1	12.4	11.4	10.6	10.1
250	18.1	14.7	13.0	11.9	11.2	10.6
300	18.6	15.2	13.4	12.4	11.7	11.1
350	19.0	15.6	13.8	12.8	12.1	11.5
400	19.4	15.9	14.2	13.1	12.4	11.8
450	19.7	16.2	14.5	13.4	12.7	12.1
500	20.0	16.5	14.7	13.7	13.0	12.4
1,000	21.9	18.3	16.5	15.5	14.8	14.2

Noncommercial thinning at age 30, 40, 50, 60; commercial thinning at age 70 (1.5 MBF); harvest cut at age 80 (13.4 MBF).

Table 25.—First thinning at age 30, residual basal area 62

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	89	62	27	---	---	---
100	190	163	127	92	56	21
150	290	263	228	192	157	121
200	390	364	328	293	257	221
250	491	464	428	393	357	322
300	591	564	529	493	458	422
350	691	665	629	594	558	523
400	792	765	730	694	658	623
450	892	865	830	794	759	723
500	992	966	930	895	859	824
1,000	1,996	1,969	1,934	1,898	1,863	1,827

Noncommercial thinning at age 30, 40, 50, 60; commercial thinning at age 70 (1.5 MBF); harvest cut at age 80 (13.4 MBF).

Site Index: 75
Rotation Age: 70

Internal Rate of Return

Present Net Worth at 8 Percent

Table 26.—First thinning at age 20,
residual basal area 46

Table 27.—First thinning at age 20,
residual basal area 46

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	15.6	11.8	10.0	8.9	8.1	7.6
100	17.7	13.8	11.9	10.8	10.0	9.4
150	19.1	15.0	13.1	11.9	11.1	10.5
200	20.0	15.9	13.9	12.7	11.9	11.3
250	20.8	16.6	14.5	13.4	12.6	11.9
300	21.4	17.1	15.1	13.9	13.1	12.5
350	21.9	17.6	15.5	14.3	13.5	12.9
400	22.4	18.0	15.9	14.7	13.9	13.3
450	22.8	18.4	16.3	15.1	14.3	13.6
500	23.2	18.7	16.6	15.4	14.6	13.9
1,000	25.7	21.0	18.8	17.5	16.6	16.0

Noncommercial thinning at ages 20, 30, 40; commercial thinning at ages 50 (1.2 MBF) and 60 (2.0 MBF); harvest cut at age 70 (16.5 MBF).

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	134	109	75	41	8	---
100	278	253	219	186	152	119
150	422	397	364	330	297	263
200	567	542	508	475	441	408
250	711	686	653	619	585	552
300	856	831	797	763	730	696
350	1,000	975	941	908	874	841
400	1,145	1,119	1,086	1,052	1,019	985
450	1,288	1,264	1,230	1,197	1,163	1,130
500	1,433	1,408	1,375	1,341	1,308	1,274
1,000	2,877	2,852	2,819	2,785	2,752	2,718

Noncommercial thinning at age 20, 30, 40; commercial thinning at ages 50 (1.2 MBF) and 60 (2.0 MBF); harvest cut at age 70 (6.6 MBF).

Site Index: 75
Rotation Age: 80

Internal Rate of Return

Present Net Worth at 8 Percent

Table 28.—First thinning at age 30,
residual basal area 66

Table 29.—First thinning at age 30,
residual basal area 66

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	16.8	13.1	11.3	10.3	9.5	8.9
100	18.9	15.1	13.2	12.1	11.4	10.8
150	20.2	16.3	14.3	13.2	12.5	11.9
200	21.1	17.1	15.1	14.0	13.2	12.6
250	21.9	17.8	15.8	14.7	13.9	13.3
300	22.5	18.3	16.3	15.2	14.4	13.7
350	23.0	18.8	16.8	15.6	14.8	14.2
400	23.5	19.2	17.2	16.0	15.2	14.5
450	23.9	19.6	17.5	16.3	15.5	14.9
500	24.3	19.9	17.8	16.6	15.8	15.2
1,000	26.8	22.1	19.9	18.7	17.9	17.2

Noncommercial thinning at age 30, 40, 50; commercial thinning at ages 60 (1.5 MBF); and 70 (2.1 MBF); harvest cut at age 80 (18.8 MBF).

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	235	210	176	143	109	76
100	481	455	422	388	355	321
150	726	701	667	634	600	567
200	972	947	913	880	846	813
250	1,217	1,192	1,159	1,125	1,092	1,058
300	1,463	1,438	1,404	1,371	1,337	1,304
350	1,708	1,684	1,650	1,616	1,583	1,549
400	1,954	1,929	1,896	1,862	1,829	1,795
450	2,200	2,175	2,141	2,108	2,074	2,041
500	2,446	2,421	2,387	2,353	2,320	2,286
1,000	4,902	4,877	4,843	4,810	4,776	4,743

Noncommercial thinning at age 30, 40, 50; commercial thinning at ages 60 (1.5 MBF) and 70 (2.1 MBF); harvest cut at age 80 (18.8 MBF).

Site Index: 75
Rotation Age: 90

Internal Rate of Return

Table 30.—First thinning at age 40,
residual basal area 73

Selling price $ per	initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	19.6	14.5	12.3	11.1	10.3	9.7
100	23.0	17.1	14.6	13.3	12.4	11.7
150	25.1	18.7	16.1	14.6	13.7	13.0
200	26.7	20.0	17.2	15.7	14.7	13.9
250	28.0	21.0	18.0	16.5	15.4	14.7
300	29.1	21.9	18.8	17.2	16.1	15.3
350	30.1	22.7	19.5	17.8	16.7	15.9
400	30.9	23.3	20.1	18.3	17.2	16.3
450	31.6	23.9	20.6	18.8	17.7	16.8
500	32.3	24.5	21.1	19.3	18.1	17.2
1,000	36.8	28.4	24.6	22.5	21.1	20.1

Noncommercial thinning at age 40, 50; commercial thinning at ages 60 (1.0 MBF), 70 (1.6 (MBF) and 80 (2.3 MBF); harvest cut at age 90 (18.8 MBF).

Present Net Worth at 8 Percent

Table 31.—First thinning at age 40,
residual basal area 73

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	269	248	218	189	160	131
100	549	527	498	468	439	410
150	828	806	777	748	718	689
200	1,107	1,086	1,056	1,027	998	968
250	1,387	1,365	1,336	1,306	1,277	1,248
300	1,666	1,644	1,615	1,586	1,556	1,527
350	1,945	1,923	1,894	1,865	1,836	1,806
400	2,225	2,203	2,173	2,144	2,115	2,086
450	2,504	2,482	2,453	2,423	2,394	2,365
500	2,783	2,761	2,732	2,703	2,673	2,644
1,000	5,576	5,554	5,525	5,496	5,466	5,437

Noncommercial thinning at age 40, 50; commercial thinning at ages 60 (1.0 MBF) 70 (1.6 MBF) and 80 (2.3 MBF); harvest cut at age 90 (18.8 MBF).

Site Index: 85
Rotation Age: 40

Internal Rate of Return

Table 32.—First thinning at age 20,
residual basal area 52

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	25.1	16.5	12.1	9.6	7.7	6.3
100	29.8	21.0	16.6	14.0	12.2	10.8
150	32.6	23.6	19.2	16.6	14.8	13.4
200	34.6	25.5	21.1	18.5	16.7	15.2
250	36.1	27.0	22.5	19.9	18.1	16.7
300	37.4	28.2	23.7	21.1	19.3	17.8
350	38.5	29.3	24.7	22.1	20.3	18.8
400	39.5	30.2	25.6	23.0	21.1	19.7
450	40.3	31.0	26.4	23.7	21.9	20.4
500	41.1	31.7	27.1	24.4	22.6	21.1
1,000	46.2	36.5	31.7	29.0	27.1	25.7

Noncommercial thinning at age 20, 30; harvest cut at age 40 (4.1 MBF).

Present Net Worth at 8 Percent

Table 33.—First thinning at age 20,
residual basal area 52

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	105	83	54	24	---	---
100	219	197	168	138	109	80
150	334	312	282	253	224	195
200	448	426	397	367	338	309
250	562	540	511	482	453	423
300	676	655	625	596	567	538
350	791	769	740	710	681	652
400	905	883	854	825	796	766
450	1,020	998	968	939	910	881
500	1,134	1,112	1,083	1,054	1,024	995
1,000	2,278	2,256	2,226	2,197	2,168	2,139

Noncommercial thinning at age 20, 30; harvest cut at age 40 (4.1 MBF).

Site Index: 85
Rotation Age: 50

Internal Rate of Return

Present Net Worth at 8 Percent

Table 34.—First thinning at age 20,
residual basal area 52

Table 35.—First thinning at age 20,
residual basal area 52

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	21.3	15.7	12.8	11.1	9.9	8.9
100	24.3	18.7	15.8	14.1	12.9	11.9
150	26.1	20.4	17.5	15.8	14.6	13.7
200	27.4	21.6	18.7	17.0	15.8	14.9
250	28.4	22.6	19.7	18.0	16.8	15.8
300	29.2	23.4	20.5	18.8	17.5	16.7
350	29.9	24.1	21.1	19.4	18.2	17.3
400	30.5	24.6	21.7	20.0	18.8	17.8
450	31.0	25.1	22.2	20.5	19.3	18.3
500	31.5	25.6	22.7	20.9	19.7	18.8
1,000	34.7	28.7	25.7	23.9	22.7	21.7

Noncommercial thinning at age 20, 30, 40; harvest cut at age 50 (12.5 MBF).

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	200	175	142	108	75	41
100	412	386	353	319	286	252
150	623	598	564	531	497	463
200	834	809	775	742	708	675
250	1,045	1,020	986	953	919	886
300	1,256	1,231	1,198	1,164	1,131	1,097
350	1,468	1,442	1,409	1,375	1,342	1,308
400	1,679	1,654	1,620	1,586	1,553	1,519
450	1,890	1,865	1,831	1,798	1,764	1,730
500	2,101	2,076	2,042	2,009	1,975	1,942
1,000	4,213	4,188	4,154	4,121	4,087	4,053

Noncommercial thinning at age 20, 30, 40; harvest cut at age 50 (12.5 MBF).

Site Index: 85
Rotation Age: 60

Internal Rate of Return

Present Net Worth at 8 Percent

Table 36.—First thinning at age 20,
residual basal area 52

Table 37.—First thinning at age 20,
residual basal area 52

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	19.2	14.8	12.6	11.3	10.3	9.6
100	21.6	17.1	14.9	13.5	12.6	11.9
150	23.1	18.5	16.2	14.9	13.9	13.2
200	24.1	19.5	17.2	15.9	14.9	14.2
250	24.9	20.3	17.9	16.6	15.6	14.9
300	25.6	20.9	18.6	17.2	16.3	15.5
350	26.2	21.4	19.1	17.7	16.8	16.0
400	26.7	21.9	19.5	18.2	17.2	16.5
450	27.1	22.3	19.9	18.6	17.6	16.9
500	27.5	22.7	20.3	18.9	18.0	17.2
1,000	30.1	25.2	22.7	21.3	20.3	19.6

Noncommercial thinning at age 20, 30, 40; commercial thinning at age 50 (2.4 MBF); harvest cut at age 60 (20.7 MBF).

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	270	245	211	178	144	110
100	551	525	492	458	425	391
150	831	806	772	739	705	672
200	1,112	1,087	1,053	1,020	986	952
250	1,393	1,367	1,334	1,300	1,267	1,233
300	1,673	1,648	1,614	1,581	1,547	1,514
350	1,954	1,929	1,895	1,862	1,828	1,794
400	2,234	2,209	2,175	2,142	2,109	2,075
450	2,515	2,490	2,456	2,423	2,389	2,356
500	2,796	2,771	2,737	2,704	2,670	2,636
1,000	5,602	5,577	5,544	5,510	5,477	5,443

Noncommercial thinning at age 20, 30, 40; commercial thinning at age 50 (2.4 MBF); harvest cut at age 60 (20.7 MBF).

Site Index: 85
Rotation Age: 70

Internal Rate of Return

Present Net Worth at 8 Percent

Table 38.—First thinning at age 20,
residual basal area 52

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	18.0	14.1	12.2	11.1	10.4	9.8
100	20.2	16.1	14.2	13.0	12.3	11.6
150	21.5	17.4	15.3	14.2	13.4	12.8
200	22.5	18.3	16.2	15.0	14.2	13.6
250	23.3	18.9	16.9	15.7	14.8	14.2
300	24.0	19.5	17.4	16.2	15.4	14.7
350	24.5	20.0	17.9	16.7	15.8	15.2
400	25.0	20.5	18.3	17.1	16.2	15.6
450	25.5	20.9	18.7	17.4	16.6	15.9
500	25.8	21.2	19.0	17.7	16.9	16.2
1,000	28.5	23.6	21.3	19.9	19.0	18.3

Noncommercial thinning at age 20, 30, 40; commercial thinning at age 50 (2.4 MBF), 60 (3.2 MBF); harvest cut at age 70 (24.5 MBF).

Table 39.—First thinning at age 20,
residual basal area 52

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	322	297	263	230	196	162
100	654	629	596	562	529	495
150	987	962	928	895	861	828
200	1,320	1,295	1,261	1,228	1,194	1,160
250	1,652	1,627	1,594	1,560	1,527	1,493
300	1,985	1,960	1,926	1,893	1,859	1,826
350	2,318	2,293	2,259	2,226	2,192	2,158
400	2,650	2,625	2,592	2,558	2,525	2,491
450	2,983	2,958	2,924	2,891	2,857	2,824
500	3,316	3,291	3,257	3,224	3,190	3,156
1,000	6,642	6,617	6,584	6,550	6,517	6,483

Noncommercial thinning at age 20, 30, 40; commercial thinning at ages 50 (2.4 MBF) and 60 (3.2 MBF); harvest cut at age 70 (24.5 MBF).

Site Index: 85
Rotation Age: 50

Internal Rate of Return

Present Net Worth at 8 Percent

Table 40.—First thinning at age 30,
residual basal area 68

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	29.5	20.7	16.3	13.7	11.9	10.5
100	34.3	25.3	20.8	18.2	16.4	14.9
150	37.1	27.9	23.4	20.8	19.0	17.5
200	39.2	29.9	25.3	22.7	20.8	19.4
250	40.8	31.4	26.8	24.1	22.3	20.8
300	42.1	32.6	28.0	25.3	23.5	22.0
350	43.2	33.7	29.0	26.4	24.5	23.0
400	44.2	34.6	29.9	27.3	25.4	23.9
450	45.1	35.4	30.7	28.0	26.1	24.7
500	45.9	36.2	31.5	28.7	26.8	25.4
1,000	51.1	41.1	36.2	33.4	31.5	30.0

Noncommercial thinning at age 30, 40; harvest cut at age 50 (7.9 MBF).

Table 41.—First thinning at age 30,
residual basal area 68

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	209	187	158	129	100	70
100	428	406	377	348	319	289
150	647	625	596	567	537	508
200	866	844	815	786	756	727
250	1,085	1,063	1,034	1,005	975	946
300	1,304	1,282	1,253	1,224	1,194	1,165
350	1,523	1,501	1,472	1,442	1,413	1,384
400	1,742	1,720	1,691	1,661	1,632	1,603
450	1,961	1,939	1,910	1,880	1,851	1,822
500	2,180	2,158	2,129	2,099	2,070	2,041
1,000	4,369	4,347	4,318	4,289	4,260	4,230

Noncommercial thinning at age 30, 40; harvest cut at age 50 (7.9 MBF).

Site Index: 85
Rotation Age: 60

Internal Rate of Return

Present Net Worth at 8 Percent

Table 42.—First thinning at age 30,
residual basal area 68

Table 43.—First thinning at age 30,
residual basal area 68

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	24.6	18.5	15.5	13.8	12.6	11.7
100	28.0	21.7	18.6	16.8	15.6	14.6
150	30.1	23.6	20.4	18.6	17.4	16.4
200	31.6	24.9	21.8	19.9	18.6	17.7
250	32.8	26.0	22.8	20.9	19.7	18.7
300	33.7	26.9	23.7	21.8	20.5	19.5
350	34.6	27.7	24.4	22.5	21.2	20.2
400	35.3	28.3	25.0	23.1	21.8	20.8
450	35.9	28.9	25.6	23.7	22.3	21.3
500	36.5	29.5	26.1	24.2	22.8	21.8
1,000	40.5	33.0	29.5	27.5	26.1	25.0

Noncommercial thinning at age 30, 40; commercial thinning at age 50 (1.0 MBF); harvest cut at age 60 (16.0 MBF).

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	344	322	293	263	234	205
100	698	676	646	617	588	559
150	1,051	1,029	1,000	971	941	912
200	1,405	1,383	1,354	1,324	1,295	1,266
250	1,759	1,737	1,707	1,678	1,649	1,620
300	2,112	2,090	2,061	2,034	2,002	1,973
350	2,466	2,444	2,415	2,385	2,356	2,327
400	2,820	2,798	2,768	2,739	2,710	2,680
450	3,173	3,151	3,122	3,093	3,063	3,034
500	3,527	3,505	3,476	3,446	3,417	3,388
1,000	7,063	7,041	7,012	6,983	6,954	6,924

Noncommercial thinning at age 30, 40; commercial thinning at age 50 (1.0 MBF); harvest cut at age 60 (16.0 MBF).

Site Index: 85
Rotation Age: 70

Internal Rate of Return

Present Net Worth at 8 Percent

Table 44.—First thinning at age 30,
residual basal area 68

Table 45.—First thinning at age 30,
residual basal area 68

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	22.5	17.3	14.9	13.5	12.6	11.9
100	25.5	20.0	17.4	15.9	15.0	14.2
150	27.5	21.6	18.9	17.4	16.4	15.6
200	28.9	22.8	20.0	18.5	17.4	16.6
250	30.0	23.7	20.9	19.3	18.3	17.4
300	31.0	24.5	21.6	20.0	18.9	18.1
350	31.8	25.2	22.3	20.7	19.5	18.7
400	32.5	25.8	22.8	21.2	20.1	19.2
450	33.2	26.4	23.3	21.7	20.5	19.7
500	33.8	26.9	23.8	22.1	20.9	20.1
1,000	37.9	30.3	26.9	25.1	23.8	22.9

Noncommercial thinning at age 30, 40; commercial thinning at age 50 (1.0 MBF), and 60 (2.5 MBF); harvest cut at age 70 (21.5 MBF).

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	486	464	435	405	376	347
100	981	960	930	901	872	842
150	1,477	1,455	1,426	1,397	1,367	1,338
200	1,973	1,951	1,922	1,892	1,863	1,834
250	2,468	2,446	2,417	2,388	2,359	2,329
300	2,964	2,942	2,913	2,884	2,854	2,825
350	3,460	3,438	3,408	3,379	3,350	3,321
400	3,955	3,933	3,904	3,875	3,846	3,816
450	4,451	4,429	4,400	4,370	4,341	4,312
500	4,947	4,925	4,895	4,866	4,837	4,808
1,000	9,903	9.881	9,852	9,822	9,793	9,764

Noncommercial thinning at age 30, 40; commercial thinning at ages 50 (1.0 MBF), and 60 (2.5 MBF); harvest cut at age 70 (21.5 MBF).

Site Index: 85
Rotation Age: 80

Internal Rate of Return

Present Net Worth at 8 Percent

Table 46.—First thinning at age 30,
residual basal area 68

Table 47.—First thinning at age 30,
residual basal area 68

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	20.8	15.7	13.4	12.2	11.3	10.7
100	24.0	18.2	15.7	14.4	13.4	12.7
150	26.1	19.9	17.2	15.7	14.8	14.0
200	27.7	21.1	18.3	16.8	15.7	15.0
250	28.9	22.1	19.2	17.6	16.5	15.8
300	30.0	23.0	19.9	18.3	17.2	16.4
350	30.9	23.7	20.6	18.9	17.8	17.0
400	31.7	24.4	21.2	19.5	18.3	17.5
450	32.4	25.0	21.7	19.9	18.8	17.9
500	33.1	25.5	22.2	20.4	19.2	18.3
1,000	37.5	29.3	25.6	23.6	22.2	21.2

Noncommercial thinning at age 30, 40; commercial thinning at age 50 (1.0 MBF), 60 (2.5 MBF), 70 (3.5 MBF); harvest cut at age 80 (26.0 MBF).

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	388	366	337	307	278	249
100	786	764	734	705	676	647
150	1,183	1,161	1,132	1,103	1,074	1,044
200	1,581	1,559	1,530	1,501	1,471	1,442
250	1,979	1,957	1,928	1,898	1,869	1,840
300	2,377	2,355	2,325	2,296	2,267	2,238
350	2,774	2,752	2,723	2,694	2,665	2,635
400	3,172	3,150	3,121	3,092	3,062	3,033
450	3,570	3,548	3,519	3,489	3,460	3,431
500	3,968	3,946	3,916	3,887	3,858	3,829
1,000	7,945	7,923	7,894	7,865	7,835	7,806

Noncommercial thinning at age 30, 40; commercial thinning at age 50 (1.0 MBF), 60 (2.5 MBF), 70 (3.5 MBF); harvest cut at age 80 (26.0 MBF).

Site Index: 85
Rotation Age: 60

Internal Rate of Return

Present Net Worth at 8 Percent

Table 48.—First thinning at age 40,
residual basal area 75

Table 49.—First thinning at age 40,
residual basal area 75

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	32.7	23.8	19.4	16.8	14.9	13.5
100	37.6	28.4	23.9	21.3	19.4	18.0
150	40.5	31.1	26.5	23.9	22.0	20.6
200	42.6	33.1	28.5	25.8	23.9	22.5
250	44.2	34.6	30.0	27.3	25.4	23.9
300	45.6	35.9	31.2	28.5	26.6	25.1
350	46.7	37.0	32.3	29.5	27.6	26.1
400	47.7	37.9	33.2	30.4	28.5	27.0
450	48.6	38.7	34.0	31.2	29.3	27.8
500	49.4	39.5	34.7	31.9	30.0	28.5
1,000	54.8	44.5	39.5	36.7	34.7	33.2

Noncommercial thinning at age 40, 50; harvest cut at age 60 (12.6 MBF).

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	342	320	290	261	232	203
100	693	671	642	613	583	554
150	1,045	1,023	993	964	935	906
200	1,396	1,374	1,345	1,316	1,286	1,257
250	1,747	1,725	1,696	1,667	1,638	1,608
300	2,099	2,077	2,048	2,018	1,989	1,960
350	2,450	2,428	2,399	2,370	2,341	2,311
400	2,802	2,780	2,751	2,721	2,692	2,663
450	3,153	3,131	3,102	3,073	3,043	3,014
500	3,505	3,483	3,453	3,424	3,395	3,366
1,000	7,019	6,997	6,968	6,938	6,909	6,880

Noncommercial thinning at age 40, 50; harvest cut at age 60 (12.6 MBF).

Site Index: 85
Rotation Age: 70

Internal Rate of Return

Table 50.—First thinning at age 40,
residual basal area 75

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	26.4	19.9	16.8	15.0	13.7	12.8
100	30.1	23.3	20.0	18.1	16.8	15.8
150	32.3	25.3	21.9	20.0	18.7	17.7
200	33.9	26.7	23.3	21.4	20.0	19.0
250	35.2	27.9	24.4	22.5	21.1	20.1
300	36.3	28.8	25.3	23.3	22.0	20.9
350	37.2	29.7	26.1	24.1	22.7	21.7
400	37.9	30.4	26.8	24.8	23.4	22.3
450	38.9	31.0	27.4	25.4	23.9	22.9
500	39.3	31.6	27.9	25.9	24.5	23.4
1,000	43.6	35.5	31.6	29.5	28.0	26.8

Noncommercial thinning at age 40, 50; commercial thinning at age 60 (2.1 MBF); harvest cut at age 70 (19.2 MBF).

Present Net Worth at 8 Percent

Table 51.—First thinning at age 40,
residual basal area 75

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	438	416	387	358	328	299
100	886	864	835	805	776	747
150	1,334	1,312	1,282	1,253	1,224	1,195
200	1,781	1,760	1,730	1,701	1,672	1,642
250	2,229	2,207	2,178	2,149	2,120	2,090
300	2,677	2,655	2,626	2,597	2,567	2,538
350	3,125	3,103	3,074	3,044	3,015	2,986
400	3,573	3,551	3,522	3,492	3,463	3,434
450	4,021	3,999	3,969	3,940	3,911	3,882
500	4,468	4,446	4,417	4,388	4,359	4,329
1,000	8,946	8,925	8,895	8,866	8,837	8,807

Noncommercial thinning at age 40, 50; commercial thinning at age 60 (2.1 MBF);harvest cut at age 70 (19.2 MBF).

Site Index: 85
Rotation Age: 80

Internal Rate of Return

Table 52.—First thinning at age 40,
residual basal area 75

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	24.3	18.5	15.9	14.4	13.4	12.6
100	27.8	21.4	18.6	17.0	15.9	15.1
150	30.1	23.3	20.3	18.6	17.5	16.6
200	31.7	24.6	21.5	19.8	18.6	17.7
250	33.0	25.7	22.5	20.7	19.5	18.6
300	34.1	26.7	23.3	21.5	20.3	19.4
350	35.1	27.5	24.1	22.2	20.9	20.0
400	35.9	28.1	24.7	22.8	21.5	20.6
450	36.7	28.8	25.3	23.3	22.1	21.1
500	37.3	29.4	25.8	23.8	22.5	21.5
1,000	41.9	33.3	29.4	27.3	25.8	24.7

Noncommercial thinning at age 40, 50; commercial thinning at ages 60 (2.1 MBF) and 70 (3.4 MBF); harvest cut at age 80 (25.0 MBF).

Present Net Worth at 8 Percent

Table 53.—First thinning at age 40,
residual basal area 75

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	590	568	538	509	480	451
100	1,189	1,167	1,138	1,108	1,079	1,050
150	1,788	1,766	1,737	1,708	1,678	1,649
200	2,388	2,366	2,336	2,307	2,278	2,249
250	2,987	2,965	2,936	2,906	2,877	2,848
300	3,586	3,564	3,535	3,506	3,476	3,447
350	4,186	4,164	4,134	4,105	4,076	4,047
400	4,785	4,763	4,734	4,704	4,675	4,646
450	5,384	5,362	5,333	5,304	5,275	5,245
500	5,984	5,962	5,932	5,903	5,874	5,845
1,000	11,976	11,954	11,926	11,896	11,867	11,838

Noncommercial thinning at age 40, 50; commercial thinning at ages 60 (2.1 MBF) and 70 (3.4 MBF); harvest cut at age 80 (25.0 MBF).

EXISTING STANDS

Site Index: 85
Rotation Age: 90

| Internal Rate of Return | Present Net Worth at 8 Percent |

Table 54.—First thinning at age 40, residual basal area 75

Table 55.—First thinning at age 40, residual basal area 75

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	23.0	16.9	14.4	13.0	12.1	11.3
100	26.9	20.0	17.0	15.5	14.4	13.6
150	29.3	21.9	18.7	17.0	15.9	15.1
200	31.1	23.4	20.0	18.3	17.1	16.2
250	32.5	24.6	21.1	19.2	18.0	17.1
300	33.7	25.6	22.0	20.1	18.8	17.8
350	34.7	26.5	22.8	20.8	19.5	18.5
400	35.5	27.2	23.5	21.4	20.1	19.1
450	36.3	27.9	24.1	22.0	20.6	19.6
500	37.0	28.5	24.7	22.6	21.1	20.1
1,000	41.8	32.8	28.6	26.3	24.7	23.5

Noncommercial thinning at age 40, 50; commercial thinning at ages 60 (2.1 MBF), 70 (3.4 MBF) and 80 (4.6 MBF); harvest cut at age 90 (28.2 MBF).

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	460	438	409	380	350	321
100	930	908	879	850	820	791
150	1,400	1,378	1,349	1,320	1,290	1,261
200	1,870	1,848	1,819	1,790	1,760	1,731
250	2,340	2,318	2,289	2,260	2,230	2,201
300	2,810	2,788	2,759	2,730	2,700	2,671
350	3,280	3,258	3,229	3,200	3,170	3,141
400	3,750	3,728	3,699	3,670	3,640	3,611
450	4,220	4,198	4,169	4,140	4,110	4,081
500	4,690	4,668	4,639	4,610	4,580	4,551
1,000	9,390	9,368	9,339	9,310	9,280	9,251

Noncommercial thinning at age 40, 50; commercial thinning at ages 60 (2.1 MBF), 70 (3.4 MBF) and 80 (4.6 MBF); harvest cut at age 90 (28.2 MBF).

APPENDIX C.
Regenerated Stands With Management

REGENERATED STANDS
Site Index: 55
Rotation Age: 60

Internal Rate of Return

Present Net Worth at 8 Percent

Table 56
First thinning age 20

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	8.7	6.2	4.8	3.9	3.2	2.6
100	10.2	7.7	6.3	5.5	4.8	4.3
150	11.0	8.5	7.2	6.3	5.7	5.3
200	11.6	9.1	7.8	7.0	6.4	5.9
250	12.0	9.6	8.2	7.4	6.8	6.4
300	12.4	9.9	8.6	7.8	7.2	6.8
350	12.7	10.3	8.9	8.1	7.5	7.1
400	13.0	10.5	9.2	8.4	7.8	7.4
450	13.2	10.8	9.4	8.6	8.1	7.6
500	13.5	11.0	9.7	8.9	8.3	7.8
1,000	14.9	12.4	11.0	10.3	9.7	9.3

Noncommercial thinning at age 20, 30, 40, 50; harvest cut at age 60 (4.5 MBF).

Table 57
First thinning age 20

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	4	---	---	---	---	---
100	17	---	---	---	---	---
150	30	9	---	---	---	---
200	43	22	---	---	---	---
250	56	35	7	---	---	---
300	69	48	20	---	---	---
350	81	61	33	6	---	---
400	94	74	46	19	---	---
450	107	87	59	31	4	---
500	120	100	72	44	17	---
1,000	250	229	202	174	147	120

Noncommercial thinning at age 20, 30, 40, 50; harvest cut at age 60 (4.5 MBF).

Site Index: 55
Rotation Age: 70

Internal Rate of Return

Present Net Worth at 8 Percent

Table 58
First thinning age 20

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	8.1	6.0	4.8	4.0	3.5	3.0
100	9.3	7.3	6.1	5.4	4.8	4.4
150	10.1	8.0	6.8	6.1	5.6	5.2
200	10.6	8.5	7.3	6.7	6.1	5.7
250	11.0	8.9	7.7	7.0	6.5	6.1
300	11.3	9.2	8.1	7.4	6.9	6.5
350	11.5	9.5	8.3	7.6	7.1	6.8
400	11.8	9.7	8.6	7.9	7.4	7.0
450	12.0	9.9	8.8	8.1	7.6	7.2
500	12.2	10.1	8.9	8.3	7.8	7.4
1,000	13.4	11.3	10.1	9.5	9.0	8.6

Noncommercial thinning at age 20, 30, 40, 50, 60; harvest cut at age 70 (6.6 MBF).

Table 59
First thinning age 20

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	1	---	---	---	---	---
100	11	---	---	---	---	---
150	21	---	---	---	---	---
200	31	10	---	---	---	---
250	41	20	---	---	---	---
300	51	30	2	---	---	---
350	61	40	12	---	---	---
400	71	50	22	---	---	---
450	81	60	32	4	---	---
500	91	70	42	14	---	---
1,000	191	170	142	114	86	59

Noncommercial thinning at age 20, 30, 40, 50, 60; harvest cut at age 70 (6.6 MBF).

REGENERATED STANDS

Site Index: 55
Rotation Age: 60

Internal Rate of Return

Table 60
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	8.3	5.9	4.6	3.7	3.0	2.5
100	9.8	7.4	6.1	5.3	4.7	4.2
150	10.6	8.2	6.9	6.1	5.5	5.1
200	11.1	8.8	7.3	6.7	6.2	5.7
250	11.6	9.2	8.0	7.2	6.6	6.2
300	12.0	9.6	8.3	7.5	7.0	6.6
350	12.3	9.9	8.6	7.9	7.3	6.9
400	12.5	10.2	8.9	8.1	7.6	7.1
450	12.8	10.4	9.1	8.4	7.8	7.4
500	13.0	10.6	9.3	8.6	8.0	7.6
1,000	14.4	11.9	10.7	9.9	9.4	8.9

Noncommercial thinning at age 30, 40, 50; harvest cut at age 60 (3.4 MBF).

Present Net Worth at 8 Percent

Table 61
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	1	---	---	---	---	---
100	11	---	---	---	---	---
150	21	3	---	---	---	---
200	30	13	---	---	---	---
250	40	22	---	---	---	---
300	49	32	9	---	---	---
350	59	42	18	---	---	---
400	69	51	28	5	---	---
450	78	61	38	14	---	---
500	88	70	47	24	---	---
1,000	184	167	143	120	97	73

Noncommercial thinning at age 30, 40, 50; harvest cut at age 60 (3.4 MBF).

Site Index: 55
Rotation Age: 70

Internal Rate of Return

Table 62
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	8.0	6.0	4.9	4.1	3.6	3.1
100	9.2	7.3	6.1	5.4	4.9	4.5
150	9.9	7.9	6.9	6.2	5.7	5.3
200	10.4	8.5	7.3	6.7	6.2	5.8
250	10.8	8.8	7.7	7.1	6.6	6.2
300	11.1	9.1	8.0	7.4	6.9	6.5
350	11.4	9.4	8.3	7.6	7.2	6.8
400	11.6	9.6	8.5	7.9	7.4	7.0
450	11.8	9.8	8.7	8.1	7.6	7.2
500	12.0	10.0	8.9	8.2	7.8	7.4
1,000	13.2	11.1	10.1	9.4	8.9	8.6

Noncommercial thinning at age 30, 40, 50, 60; harvest cut at age 70 (5.6 MBF).

Present Net Worth at 8 Percent

Table 63
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	---	---	---	---	---	---
100	9	---	---	---	---	---
150	17	---	---	---	---	---
200	25	8	---	---	---	---
250	34	16	---	---	---	---
300	42	25	1	---	---	---
350	51	33	10	---	---	---
400	59	42	18	---	---	---
450	68	50	26	3	---	---
500	76	58	35	11	---	---
1,000	160	143	119	96	72	49

Noncommercial thinning at age 30, 40, 50, 60; harvest cut at age 70 (5.6 MBF).

REGENERATED STANDS

Site Index: 55
Rotation Age: 80

Internal Rate of Return

Table 64
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	7.7	6.0	5.0	4.4	3.9	3.5
100	8.8	7.1	6.1	5.5	5.1	4.7
150	9.4	7.7	6.7	6.1	5.7	5.4
200	9.8	8.1	7.2	6.6	6.2	5.8
250	10.2	8.5	7.5	6.9	6.5	6.2
300	10.4	8.7	7.8	7.2	6.8	6.5
350	10.7	8.9	8.0	7.4	7.0	6.7
400	10.9	9.1	8.2	7.6	7.2	6.9
450	11.0	9.3	8.4	7.8	7.4	7.1
500	11.2	9.5	8.5	7.9	7.5	7.2
1,000	12.2	10.5	9.5	9.0	8.6	8.2

Noncommercial thinning at age 30, 40, 50, 60, 70; harvest cut at age 80 (9.0 MBF).

Present Net Worth at 8 Percent

Table 65
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	---	---	---	---	---	---
100	6	---	---	---	---	---
150	13	---	---	---	---	---
200	20	2	---	---	---	---
250	27	9	---	---	---	---
300	34	16	---	----	---	---
350	41	23	---	---	----	---
400	48	30	7	---	---	---
450	55	37	14	---	---	---
500	62	45	21	---	---	---
1,000	133	115	92	68	44	21

Noncommercial thinning at age 30, 40, 50, 60, 70; harvest cut at age 80 (9.0 MBF).

Site Index: 65
Rotation Age: 60

Internal Rate of Return

Table 66
First thinning age 20

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	9.7	7.2	5.8	5.0	4.3	3.8
100	11.1	8.7	7.3	6.5	5.9	5.4
150	12.0	9.5	8.2	7.4	6.8	6.3
200	12.6	10.1	8.8	7.9	7.4	6.9
250	13.0	10.5	9.2	8.4	7.8	7.4
300	13.4	10.9	9.6	8.8	8.2	7.8
350	13.7	11.2	9.9	9.1	8.5	8.1
400	14.0	11.5	10.2	9.4	8.8	8.3
450	14.2	11.7	10.4	9.6	9.0	8.6
500	14.4	11.9	10.6	9.8	9.3	8.8
1,000	15.8	13.3	12.0	11.2	10.6	10.2

Noncommercial thinning at age 20, 30, 40, 50; harvest cut at age 60 (7.3 MBF).

Present Net Worth at 8 Percent

Table 67
First thinning age 20

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	12	---	---	---	---	---
100	32	12	---	---	---	---
150	53	33	5	---	---	---
200	74	53	26	---	---	---
250	95	74	47	19	---	---
300	116	95	67	40	12	---
350	137	116	88	61	33	5
400	157	137	109	82	54	26
450	178	158	130	102	75	47
500	199	178	151	123	96	68
1,000	408	387	359	332	304	276

Noncommercial thinning at age 20, 30, 40, 50; harvest cut at age 60 (7.3 MBF).

REGENERATED STANDS

Site Index: 65
Rotation Age: 70

Internal Rate of Return

Present Net Worth at 8 Percent

Table 68
First thinning age 20

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	9.7	7.5	6.4	5.6	5.1	4.7
100	10.9	8.8	7.6	6.9	6.4	6.0
150	11.6	9.5	8.3	7.6	7.1	6.8
200	12.1	10.0	8.9	8.2	7.7	7.3
250	12.6	10.4	9.2	8.6	8.1	7.7
300	12.9	10.7	9.6	8.9	8.4	8.0
350	13.1	11.0	9.8	9.1	8.6	8.3
400	13.4	11.2	10.1	9.4	8.9	8.5
450	13.6	11.4	10.3	9.6	9.1	8.7
500	13.8	11.6	10.5	9.8	9.3	8.9
1,000	15.0	12.8	11.7	11.0	10.5	10.1

Noncommercial thinning at age 20, 30, 40, 50; commercial thinning at age 60 (1.2 MBF); harvest cut at age 70 (11.0 MBF).

Table 69
First thinning age 20

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	14	---	---	---	---	---
100	37	17	---	---	---	---
150	61	40	12	---	---	---
200	84	63	36	8	---	---
250	107	87	59	31	4	---
300	131	110	82	55	27	---
350	154	133	105	78	50	23
400	177	156	129	101	74	46
450	200	180	152	125	97	69
500	224	203	175	148	120	93
1,000	457	436	409	381	353	326

Noncommercial thinning at age 20, 30, 40, 50; commercial thinning at age 60 (1.2 MBF); harvest cut at age 70 (11.0 MBF).

Site Index: 65
Rotation Age: 60

Internal Rate of Return

Present Net Worth at 8 Percent

Table 70
First thinning age 30

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	9.2	6.9	5.6	4.7	4.1	3.6
100	10.6	8.3	7.0	6.2	5.6	5.2
150	11.5	9.1	7.8	7.0	6.5	6.0
200	12.0	9.7	8.4	7.6	7.1	6.6
250	12.5	10.1	8.8	8.1	7.5	7.1
300	12.9	10.5	9.2	8.4	7.9	7.4
350	13.1	10.8	9.5	8.7	8.2	7.7
400	13.4	11.0	9.7	9.0	8.4	8.0
450	13.6	11.2	10.0	9.2	8.7	8.2
500	13.9	11.4	10.2	9.4	8.9	8.5
1,000	15.2	12.8	11.4	10.8	10.2	9.8

Noncommercial thinning at age 30, 40, 50; harvest cut at age 60 (5.2 MBF).

Table 71
First thinning age 30

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	7	---	---	---	---	---
100	22	4	---	---	---	---
150	37	19	---	---	---	---
200	52	34	11	---	---	---
250	67	49	26	2	---	---
300	81	64	41	17	---	---
350	96	79	56	32	9	---
400	111	94	71	47	24	1
450	126	109	85	62	39	15
500	141	124	100	78	54	30
1,000	291	273	250	227	203	180

Noncommercial thinning at age 30, 40, 50; harvest cut at age 60 (5.2 MBF).

Site Index: 65
Rotation Age: 70

Internal Rate of Return	Present Net Worth at 8 Percent

Table 72
First thinning age 30

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	9.3	7.3	6.2	5.4	5.0	4.6
100	10.5	8.5	7.4	6.8	6.3	5.9
150	11.2	9.2	8.1	7.5	7.0	6.6
200	11.7	9.7	8.6	8.0	7.5	7.1
250	12.1	10.1	9.0	8.3	7.9	7.5
300	12.4	10.4	9.3	8.6	8.2	7.8
350	12.7	10.6	9.5	8.9	8.4	8.1
400	12.9	10.9	9.8	9.1	8.7	8.3
450	13.1	11.0	10.0	9.3	8.9	8.5
500	13.3	11.2	10.1	9.5	9.0	8.7
1,000	14.4	12.4	11.3	10.6	10.2	9.8

Noncommercial thinning at age 30, 40, 50, 60; harvest cut at age 70 (9.8 MBF).

Table 73
First thinning age 30

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	9	---	---	---	---	---
100	27	10	---	---	---	---
150	45	27	4	---	---	---
200	63	45	22	---	---	---
250	81	63	40	16	---	---
300	99	81	57	34	10	---
350	116	99	75	52	28	5
400	134	116	93	69	46	22
450	152	134	111	87	64	40
500	170	152	129	105	81	58
1,000	347	330	307	283	260	236

Noncommercial thinning at age 30, 40, 50, 60; harvest cut at age 70 (9.8 MBF).

Site Index: 65
Rotation Age: 80

Internal Rate of Return	Present Net Worth at 8 Percent

Table 74
First thinning age 30

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	8.9	7.1	6.2	5.6	5.1	4.8
100	10.0	8.2	7.2	6.7	6.2	5.9
150	10.6	8.8	7.8	7.3	6.8	6.5
200	11.0	9.2	8.3	7.7	7.3	7.0
250	11.4	9.6	8.6	8.0	7.6	7.3
300	11.6	9.8	8.9	8.3	7.9	7.6
350	11.9	10.1	9.1	8.5	8.1	7.8
400	12.1	10.3	9.3	8.7	8.3	8.0
450	12.3	10.4	9.5	8.9	8.5	8.2
500	12.4	10.6	9.6	9.0	8.6	8.3
1,000	13.5	11.6	10.7	10.1	9.7	9.3

Noncommercial thinning at age 30, 40, 50, 60; commercial thinning at age 70 (1.5 MBF); harvest cut at age 80 (13.4 MBF).

Table 75
First thinning age 30

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	7	---	---	---	---	---
100	21	4	---	---	---	---
150	36	19	---	---	---	---
200	51	34	10	---	---	---
250	66	48	25	1	---	---
300	81	63	40	16	---	---
350	96	78	55	31	8	---
400	111	93	70	46	23	---
450	126	108	85	61	37	14
500	141	123	99	76	52	29
1,000	290	272	248	225	201	178

Noncommercial thinning at age 30, 40, 50, 60; commercial thinning at age 70 (1.5 MBF); harvest cut at age 80 (13.4 MBF).

Site Index: 65
Rotation Age: 60

Internal Rate of Return

Table 76
First thinning age 40

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	9.0	6.8	5.5	4.8	4.2	3.7
100	10.4	8.1	6.9	6.2	5.6	5.2
150	11.2	8.9	7.7	6.9	6.4	6.0
200	11.8	9.5	8.3	7.5	7.0	6.5
250	12.2	9.9	8.7	7.9	7.4	7.0
300	12.6	10.3	9.0	8.3	7.7	7.3
350	12.9	10.5	9.3	8.6	8.0	7.6
400	13.1	10.8	9.6	8.8	8.3	7.9
450	13.4	11.0	9.8	9.0	8.5	8.1
500	13.6	11.2	10.0	9.3	8.7	8.3
1,000	15.0	12.5	11.3	10.5	10.0	9.6

Noncommercial thinning at age 40, 50; harvest cut at age 60 (4.5 MBF).

Present Net Worth at 8 Percent

Table 77
First thinning age 40

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	5	---	---	---	---	---
100	18	2	---	---	---	---
150	31	15	---	---	---	---
200	44	28	6	---	---	---
250	56	40	19	---	---	---
300	69	53	32	11	---	---
350	82	66	45	23	2	---
400	95	79	58	36	15	---
450	108	92	70	49	28	6
500	121	105	83	62	41	19
1,000	249	233	212	190	169	147

Noncommercial thinning at age 40, 50; harvest cut at age 60 (4.5 MBF).

Site Index: 65
Rotation Age: 70

Internal Rate of Return

Table 78
First thinning age 40

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	8.7	6.8	5.8	5.1	4.6	4.2
100	9.9	8.0	6.9	6.3	5.8	5.5
150	10.6	8.7	7.6	7.0	6.5	6.1
200	11.1	9.1	8.1	7.5	7.0	6.6
250	11.5	9.5	8.5	7.8	7.4	7.0
300	11.8	9.8	8.7	8.1	7.7	7.3
350	12.0	10.0	9.0	8.4	7.9	7.5
400	12.2	10.3	9.2	8.6	8.1	7.8
450	12.5	10.5	9.4	8.8	8.3	8.0
500	12.6	10.6	9.6	8.9	8.5	8.1
1,000	13.8	11.8	10.7	10.1	9.6	9.3

Noncommercial thinning at age 40, 50, 60; harvest cut at age 70 (7.9 MBF).

Present Net Worth at 8 Percent

Table 79
First thinning age 40

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	4	---	---	---	---	---
100	16	---	---	---	---	---
150	28	12	---	---	---	---
200	40	24	2	---	---	---
250	52	36	14	---	---	---
300	64	48	26	5	---	---
350	76	60	38	17	---	---
400	88	72	50	29	7	---
450	100	84	62	41	19	---
500	112	96	74	52	31	9
1,000	231	215	194	172	150	129

Noncommercial thinning at age 40, 50, 60; harvest cut at age 70 (7.9 MBF).

REGENERATED STANDS

Site Index: 65
Rotation Age: 80

Internal Rate of Return

Table 80
First thinning age 40

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	8.3	6.6	5.7	5.1	4.7	4.3
100	9.3	7.6	6.7	6.2	5.8	5.4
150	9.9	8.2	7.3	6.7	6.3	6.0
200	10.3	8.6	7.7	7.2	6.8	6.5
250	10.7	9.0	8.0	7.5	7.1	6.8
300	10.9	9.2	8.3	7.7	7.3	7.0
350	11.1	9.4	8.5	8.0	7.6	7.3
400	11.3	9.6	8.7	8.2	7.8	7.5
450	11.5	9.8	8.9	8.3	7.9	7.6
500	11.7	9.9	9.0	8.5	8.1	7.8
1,000	12.7	10.9	10.0	9.5	9.1	8.7

Noncommercial thinning at age 40, 50, 60 70; harvest cut at age 80 (10.0 MBF).

Present Net Worth at 8 Percent

Table 81
First thinning age 40

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	2	---	---	---	---	---
100	11	---	---	---	---	---
150	20	4	---	---	---	---
200	30	14	---	---	---	---
250	39	23	1	---	---	---
300	49	32	11	---	---	---
350	58	42	20	---	---	---
400	67	51	30	8	---	---
450	77	61	39	17	---	---
500	86	70	48	27	5	---
1,000	180	164	143	121	99	78

Noncommercial thinning at age 40, 50, 60, 70; harvest cut at age 80 (10.0 MBF).

Site Index: 75
Rotation Age: 50

Internal Rate of Return

Table 82
First thinning age 20

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	11.8	8.8	7.1	6.1	5.4	4.8
100	13.5	10.5	8.9	7.9	7.2	6.6
150	14.5	11.5	9.9	8.9	8.2	7.7
200	15.2	12.2	10.6	9.6	8.9	8.4
250	15.7	12.7	11.1	10.2	9.5	8.9
300	16.2	13.2	11.6	10.6	9.9	9.4
350	16.6	13.5	11.9	11.0	10.3	9.8
400	16.9	13.9	12.3	11.3	10.6	10.1
450	17.2	14.1	12.5	11.6	10.9	10.4
500	17.5	14.4	12.8	11.8	11.2	10.6
1,000	19.2	16.1	14.5	13.5	12.8	12.3

Noncommercial thinning at age 20, 30, 40; harvest cut at age 50 (7.6 MBF).

Present Net Worth at 8 Percent

Table 83
First thinning age 20

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	31	11	---	---	---	---
100	72	52	24	---	---	---
150	113	92	65	38	11	---
200	153	133	105	78	51	24
250	194	173	146	119	92	64
300	234	214	187	159	132	105
350	275	254	227	200	173	146
400	315	295	268	241	213	186
450	356	336	308	281	254	227
500	396	376	349	322	294	267
1,000	802	782	755	727	700	673

Noncommercial thinning at age 20, 30, 40; harvest cut at age 50 (7.6 MBF).

Site Index: 75
Rotation Age: 60

Internal Rate of Return

Table 84
First thinning age 20

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	11.6	9.1	7.7	6.9	6.3	5.8
100	13.1	10.5	9.2	8.4	7.0	7.3
150	13.9	11.4	10.0	9.2	8.6	8.2
200	14.5	11.9	10.6	9.8	9.2	8.8
250	15.0	12.4	11.0	10.2	9.7	9.2
300	15.4	12.8	11.4	10.6	10.0	9.6
350	15.7	13.1	11.7	10.9	10.4	9.9
400	16.0	13.4	12.0	11.2	10.6	10.2
450	16.2	13.6	12.3	11.4	10.9	10.4
500	16.4	13.8	12.5	11.6	11.1	10.6
1,000	17.9	15.2	13.9	13.1	12.5	12.0

Noncommercial thinning at age 20, 30, 40; commercial thinning at age 50 (1.2 MBF); harvest cut at age 60 (12.7 MBF).

Present Net Worth at 8 Percent

Table 85
First thinning age 20

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	41	20	---	---	---	---
100	90	70	43	16	---	---
150	140	120	93	65	38	11
200	190	170	143	115	88	61
250	240	220	192	165	138	111
300	290	269	242	215	188	161
350	340	319	292	265	238	210
400	389	369	342	315	287	260
450	439	419	392	364	337	310
500	489	469	441	414	387	360
1,000	987	967	940	913	885	858

Noncommercial thinning at age 20, 30, 40; commercial thinning at age 50 (1.2 MBF); harvest cut at age 60 (12.7 MBF).

Site Index: 75
Rotation Age: 70

Internal Rate of Return

Table 86
First thinning age 20

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	10.9	8.7	7.4	6.7	6.2	5.8
100	12.2	9.9	8.7	8.0	7.4	7.1
150	13.0	10.7	9.5	8.7	8.2	7.9
200	13.6	11.2	10.0	9.3	8.8	8.4
250	14.0	11.6	10.4	9.7	9.2	8.8
300	14.4	12.0	10.7	10.0	9.5	9.1
350	14.7	12.3	11.0	10.3	9.8	9.4
400	14.9	12.5	11.3	10.5	10.0	9.7
450	15.2	12.7	11.5	10.8	10.2	9.9
500	15.4	12.9	11.7	10.9	10.4	10.0
1,000	16.8	14.2	13.0	12.2	11.7	11.3

Noncommercial thinning at age 20, 30, 40; commercial thinning at ages 50 (1.2 MBF) and 60 (2.0 MBF); harvest cut at age 70 (16.5 MBF).

Present Net Worth at 8 Percent

Table 87
First thinning age 20

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	33	12	---	---	---	---
100	74	54	27	---	---	---
150	116	96	69	41	14	---
200	158	137	110	83	55	29
250	200	179	152	125	98	70
300	241	221	194	167	139	112
350	283	263	236	208	181	154
400	325	305	277	250	223	196
450	367	346	319	292	265	238
500	409	388	361	334	307	279
1,000	826	806	779	752	724	697

Noncommercial thinning at age 20, 30, 40; commercial thinning at ages 50 (1.2 MBF) and 60 (2.0 (MBF); harvest cut at age 70 (16.5 MBF).

REGENERATED STANDS

Site Index: 75
Rotation Age: 50

Internal Rate of Return

Table 88
First thinning age 30

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	10.9	8.1	6.5	5.5	4.8	4.2
100	12.6	9.7	8.2	7.2	6.6	6.0
150	13.6	10.7	9.1	8.2	7.5	7.0
200	14.3	11.3	9.8	8.9	8.3	7.7
250	14.8	11.9	10.3	9.4	8.8	8.2
300	15.2	12.3	10.8	9.8	9.2	8.7
350	15.6	12.7	11.1	10.2	9.5	9.0
400	15.9	13.0	11.4	10.5	9.8	9.3
450	16.2	13.2	11.7	10.8	10.1	9.6
500	16.4	13.5	11.9	11.0	10.4	9.9
1,000	18.1	15.1	13.5	12.6	12.0	11.5

Noncommercial thinning at age 30, 40; harvest cut at age 50 (4.9 MBF).

Present Net Worth at 8 Percent

Table 89
First thinning age 30

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	18	1	---	---	---	---
100	44	26	4	---	---	---
150	69	52	29	6	---	---
200	95	78	55	32	9	---
250	121	104	81	58	35	12
300	147	130	107	84	61	38
350	173	156	133	110	87	64
400	199	182	159	136	113	90
450	225	207	185	162	139	116
500	250	233	210	187	165	142
1,000	509	492	469	446	423	400

Noncommercial thinning at age 30, 40; harvest cut at age 50 (4.9 MBF).

Site Index: 75
Rotation Age: 60

Internal Rate of Return

Table 90
First thinning age 30

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	10.4	8.1	6.8	6.0	5.4	4.9
100	11.8	9.5	8.2	7.4	6.9	6.4
150	12.6	10.3	9.0	8.2	7.7	7.2
200	13.2	10.8	9.5	8.8	8.2	7.8
250	13.7	11.3	10.0	9.2	8.7	8.3
300	14.0	11.6	10.3	9.6	9.0	8.6
350	14.3	11.9	10.6	9.9	9.3	8.9
400	14.6	12.2	10.9	10.1	9.6	9.2
450	14.8	12.4	11.1	10.4	9.8	9.4
500	15.0	12.6	11.3	10.6	10.0	9.6
1,000	16.4	13.9	12.6	11.9	11.4	10.9

Noncommercial thinning at age 30, 40, 50; harvest cut at age 60 (9.4 MBF).

Present Net Worth at 8 Percent

Table 91
First thinning age 30

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	19	1	---	---	---	---
100	46	28	5	---	---	---
150	73	55	32	9	---	---
200	100	82	59	36	12	---
250	127	109	86	63	39	16
300	154	136	113	90	66	43
350	181	163	140	117	93	70
400	208	190	167	144	120	97
450	235	217	194	171	147	124
500	262	244	221	198	174	151
1,000	532	514	491	468	444	421

Noncommercial thinning at age 30, 40, 50; harvest cut at age 60 (9.4 MBF).

Site Index: 75
Rotation Age: 70

Internal Rate of Return

Present Net Worth at 8 Percent

Table 92
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	10.4	8.3	7.2	6.6	6.1	5.7
100	11.6	9.5	8.4	7.8	7.3	6.9
150	12.3	10.2	9.1	8.5	8.0	7.6
200	12.8	10.7	9.6	8.9	8.5	8.1
250	13.2	11.1	10.0	9.3	8.9	8.5
300	13.5	11.4	10.3	9.6	9.2	8.8
350	13.8	11.7	10.6	9.9	9.4	9.0
400	14.0	11.9	10.8	10.1	9.6	9.3
450	14.2	12.1	11.0	10.3	9.8	9.5
500	14.4	12.3	11.1	10.5	10.2	9.6
1,000	15.6	13.5	12.3	11.7	11.2	10.8

Noncommercial thinning at age 30, 40, 50; commercial thinning age 60 (1.5 (MBF); harvest cut at age 70 (15.1 MBF).

Table 93
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	23	6	---	---	---	---
100	55	37	14	---	---	---
150	86	69	45	22	---	---
200	118	100	77	54	30	7
250	149	132	109	85	62	39
300	181	163	140	117	93	70
350	213	195	172	148	125	102
400	244	227	203	180	157	133
450	276	258	235	211	188	165
500	307	290	266	243	220	196
1,000	623	605	582	558	535	512

Noncommercial thinning at age 30, 40, 50; commercial thinning at age 60 (1.5 MBF); harvest cut at age 70 (15.1 MBF).

Site Index: 75
Rotation Age: 80

Internal Rate of Return

Present Net Worth at 8 Percent

Table 94
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	9.8	8.0	7.0	6.4	5.9	5.6
100	10.9	9.1	8.1	7.5	7.0	6.7
150	11.6	9.7	8.7	8.1	7.7	7.3
200	12.1	10.2	9.1	8.5	8.1	7.8
250	12.4	10.5	9.5	8.9	8.5	8.1
300	12.7	10.8	9.8	9.2	8.7	8.4
350	13.0	11.0	10.0	9.4	9.0	8.6
400	13.2	11.2	10.2	9.6	9.2	8.8
450	13.4	11.4	10.4	9.8	9.4	9.0
500	13.6	11.6	10.6	9.9	9.5	9.2
1,000	14.7	12.7	11.7	11.0	10.6	10.3

Noncommercial thinning at age 30, 40, 50; commercial thinning at ages 60 (1.5 MBF) and 70 (2.1 MBF); harvest cut at age 80 (18.8 MBF).

Table 95
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	17	---	---	---	---	---
100	43	25	2	---	---	---
150	69	51	28	4	---	---
200	94	77	53	31	7	---
250	120	102	79	56	32	9
300	146	128	105	81	58	35
350	171	154	130	107	84	60
400	197	179	156	133	109	86
450	222	205	182	158	135	112
500	248	231	207	184	160	137
1,000	505	487	464	440	417	394

Noncommercial thinning at age 30, 40, 50; commercial thinning at ages 60 (1.5 MBF) and 70 (2.1 MBF); harvest cut at age 80 (18.8 MBF).

REGENERATED STANDS

Site Index: 75
Rotation Age: 60

Internal Rate of Return

Table 96
First thinning age 40

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	10.4	8.1	6.9	6.1	5.5	5.1
100	11.7	9.4	8.2	7.5	6.9	6.5
150	12.5	10.2	9.0	8.2	7.7	7.3
200	13.1	10.7	9.5	8.8	8.2	7.8
250	13.5	11.2	9.9	9.2	8.7	8.3
300	13.9	11.5	10.3	9.5	9.0	8.6
350	14.2	11.8	10.6	9.8	9.3	8.9
400	14.5	12.1	10.8	10.1	9.5	9.1
450	14.7	12.3	11.0	10.3	9.8	9.4
500	14.9	12.5	11.2	10.5	10.0	9.6
1,000	16.3	13.8	12.6	11.8	11.3	10.9

Noncommercial thinning at age 40, 50; harvest cut at age 60 (8.7 MBF).

Present Net Worth at 8 Percent

Table 97
First thinning age 40

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	17	1	---	---	---	---
100	42	26	5	---	---	---
150	67	51	30	8	---	---
200	92	76	55	33	12	---
250	117	101	79	58	37	15
300	142	126	104	83	62	40
350	167	151	129	108	87	65
400	191	176	154	133	112	90
450	217	200	179	158	136	115
500	241	225	204	183	161	140
1,000	491	475	453	432	411	389

Noncommercial thinning at age 40, 50; harvest cut at age 60 (8.7 MBF).

Site Index: 75
Rotation Age: 70

Internal Rate of Return

Table 98
First thinning age 40

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	10.1	8.2	7.1	6.5	6.0	5.6
100	11.3	9.3	8.2	7.6	7.1	6.8
150	12.0	10.0	8.9	8.3	7.8	7.5
200	12.5	10.5	9.4	8.7	8.3	7.9
250	12.9	10.8	9.7	9.1	8.7	8.3
300	13.2	11.1	10.0	9.4	8.9	8.6
350	13.5	11.4	10.3	9.7	9.2	8.9
400	13.7	11.6	10.5	9.9	9.4	9.1
450	13.9	11.8	10.7	10.1	9.6	9.3
500	14.1	12.0	10.9	10.3	9.8	9.4
1,000	15.3	13.1	12.0	11.4	10.9	10.6

Noncommercial thinning at age 40, 50; commercial thinning at age 60 (1.0 MBF); harvest cut at age 70 (12.8 MBF).

Present Net Worth at 8 Percent

Table 99
First thinning age 40

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	18	2	---	---	---	---
100	45	28	7	---	---	---
150	71	55	33	12	---	---
200	97	81	59	38	17	---
250	123	107	86	64	43	22
300	149	133	112	90	69	48
350	175	159	138	117	95	74
400	201	185	164	143	121	100
450	228	212	190	169	147	126
500	254	238	216	195	174	152
1,000	515	499	478	456	435	414

Noncommercial thinning at age 40, 50; commercial thinning at age 60 (1.0 MBF); harvest cut at age 70 (12.8 MBF).

REGENERATED STANDS

Site Index: 75
Rotation Age: 80

Internal Rate of Return

Table 100
First thinning age 40

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	9.5	7.8	6.8	6.3	5.9	5.5
100	10.6	8.8	7.9	7.3	6.9	6.6
150	11.3	9.5	8.5	7.9	7.5	7.2
200	11.7	9.9	8.9	8.3	7.9	7.6
250	12.1	10.2	9.3	8.7	8.3	7.9
300	12.4	10.5	9.5	8.9	8.5	8.2
350	12.6	10.7	9.7	9.2	8.7	8.4
400	12.8	10.9	9.9	9.4	8.9	8.6
450	13.0	11.1	10.1	9.5	9.1	8.8
500	13.2	11.3	10.3	9.7	9.3	9.0
1,000	14.3	12.4	11.3	10.7	10.3	10.0

Noncommercial thinning at age 40, 50; commercial thinning at ages 60 (1.0 MBF) and 70 (1.6 MBF); harvest cut at age 80 (16.4 MBF).

Present Net Worth at 8 Percent

Table 101
First thinning age 40

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	13	---	---	---	---	---
100	34	18	---	---	---	---
150	55	39	17	---	---	---
200	75	59	38	17	---	---
250	96	80	59	37	16	---
300	117	101	80	58	37	16
350	138	122	101	79	58	36
400	159	143	121	100	79	57
450	180	163	142	121	99	78
500	200	184	163	142	120	99
1,000	408	392	371	350	328	307

Noncommercial thinning at age 40, 50; commercial thinning at ages 60 (1.0 MBF) and 70 (1.6 MBF); harvest cut at age 80 (16.4 MBF).

Site Index: 85
Rotation Age: 40

Internal Rate of Return

Table 102
First thinning age 20

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	12.9	9.1	7.0	5.7	4.7	4.0
100	15.0	11.2	9.2	7.9	7.0	6.3
150	16.3	12.4	10.4	9.2	8.3	7.6
200	17.2	13.3	11.3	10.1	9.2	8.5
250	17.9	14.0	12.0	10.8	9.9	9.2
300	18.4	14.5	12.5	11.3	10.5	9.8
350	18.9	15.0	13.0	11.8	10.9	10.3
400	19.3	15.4	13.4	12.2	11.3	10.7
450	19.7	15.8	13.7	12.5	11.7	11.0
500	20.0	16.1	14.1	12.9	12.0	11.3
1,000	22.2	18.2	16.1	14.9	14.1	13.4

Noncommercial thinning at age 20, 30; harvest cut at age 40 (4.1 MBF).

Present Net Worth at 8 Percent

Table 103
First thinning age 20

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	31	11	---	---	---	---
100	70	51	25	---	---	---
150	110	90	64	38	12	---
200	150	130	104	77	51	25
250	189	170	143	117	91	65
300	229	209	183	157	130	104
350	269	249	223	196	170	144
400	308	289	262	236	210	183
450	348	328	302	276	249	223
500	388	368	342	315	289	263
1,000	784	764	738	712	685	659

Noncommercial thinning at age 20, 30; harvest cut at age 40 (4.1 MBF).

Site Index: 85
Rotation Age: 50

Internal Rate of Return

Table 104
First thinning age 20

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	13.0	10.0	8.4	7.4	6.7	6.1
100	14.7	11.7	10.1	9.1	8.5	7.9
150	15.7	12.7	11.1	10.1	9.5	8.9
200	16.4	13.4	11.8	10.8	10.1	9.6
250	17.0	13.9	12.3	11.4	10.7	10.2
300	17.4	14.4	12.8	11.8	11.1	10.6
350	17.8	14.7	13.1	12.2	11.5	11.0
400	18.1	15.1	13.5	12.5	11.8	11.3
450	18.4	15.3	13.7	12.8	12.1	11.6
500	18.7	15.6	14.0	13.0	12.4	11.8
1,000	20.4	17.3	15.6	14.7	14.0	13.5

Noncommercial thinning at age 20, 30, 40; harvest cut at age 50 (12.5 MBF).

Present Net Worth at 8 Percent

Table 105
First thinning age 20

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	57	37	10	---	---	---
100	124	104	77	49	22	---
150	191	170	143	116	89	62
200	257	237	210	183	155	128
250	324	304	276	249	222	195
300	391	370	343	316	289	261
350	457	437	410	382	355	328
400	524	503	476	449	422	395
450	591	570	543	516	489	461
500	657	637	610	582	555	528
1,000	1,323	1,303	1,276	1,249	1,221	1,194

Noncommercial thinning at age 20, 30, 40; harvest cut at age 50 (12.5 MBF).

Site Index: 85
Rotation Age: 60

Internal Rate of Return

Table 106
First thinning age 20

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	12.7	10.2	8.8	8.0	7.4	6.9
100	14.2	11.6	10.3	9.4	8.9	8.4
150	15.1	12.5	11.1	10.3	9.7	9.2
200	15.7	13.0	11.7	10.9	10.3	9.8
250	16.1	13.5	12.1	11.3	10.7	10.3
300	16.5	13.9	12.5	11.7	11.1	10.7
350	16.9	14.2	12.8	12.0	11.4	11.0
400	17.1	14.5	13.1	12.3	11.7	11.3
450	17.4	14.7	13.3	12.5	11.9	11.5
500	17.6	14.9	13.6	12.7	12.2	11.7
1,000	19.1	16.4	15.0	14.2	13.6	13.1

Noncommercial thinning at age 20, 30, 40; commercial thinning at age 50 (2.4 MBF); harvest cut at age 60 (20.7 MBF).

Present Net Worth at 8 Percent

Table 107
First thinning age 20

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	75	54	27	---	---	---
100	159	138	111	84	57	29
150	243	222	195	168	141	113
200	327	306	279	252	225	197
250	410	390	363	336	308	281
300	494	474	447	420	392	365
350	578	558	531	504	476	449
400	662	642	615	587	560	533
450	746	726	699	671	644	617
500	830	810	783	755	728	701
1,000	1,669	1,649	1,622	1,595	1,567	1,540

Noncommercial thinning at age 20, 30, 40; commercial thinning at age 50 (2.4 MBF); harvest cut at age 60 (20.7 MBF).

Site Index: 85
Rotation Age: 70

Internal Rate of Return

Table 108
First thinning age 20

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	12.4	10.1	8.9	8.2	7.7	7.3
100	13.7	11.4	10.2	9.5	9.0	8.6
150	14.5	12.2	10.9	10.2	9.7	9.3
200	15.1	12.7	11.5	10.8	10.3	9.9
250	15.5	13.1	11.9	11.2	10.7	10.3
300	15.9	13.5	12.2	11.5	11.0	10.6
350	16.2	13.8	12.5	11.8	11.3	10.9
400	16.5	14.0	12.8	12.0	11.5	11.1
450	16.7	14.2	13.0	12.2	11.7	11.3
500	16.9	14.4	13.2	12.4	11.9	11.5
1,000	18.3	15.8	14.5	13.7	13.2	12.8

Noncommercial thinning at age 20, 30, 40; commercial thinning at ages 50 (2.4 MBF) and 60 (3.2 MBF); harvest cut at age 70 (24.5 MBF).

Present Net Worth at 8 Percent

Table 109
First thinning age 20

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	87	66	39	12	---	---
100	183	162	135	108	81	53
150	279	258	231	204	177	149
200	374	354	327	300	272	245
250	470	450	423	396	368	341
300	566	546	519	492	464	437
350	662	642	615	587	560	533
400	758	738	711	683	656	629
450	854	834	806	779	752	725
500	950	930	902	875	848	821
1,000	1,909	1,889	1,862	1,834	1,807	1,780

Noncommercial thinning at age 20, 30, 40; commercial thinning at ages 50 (2.4 MBF) and 60 (3.2 MBF); harvest cut at age 70 (24.5 MBF).

Site Index: 85
Rotation Age: 50

Internal Rate of Return

Table 110
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	10.5	7.7	6.1	5.1	4.4	3.8
100	12.2	9.3	7.8	6.8	6.1	5.6
150	13.1	10.3	8.7	7.8	7.1	6.6
200	13.9	10.9	9.4	8.5	7.8	7.3
250	14.4	11.5	9.9	9.0	8.4	7.8
300	14.8	11.9	10.4	9.4	8.8	8.3
350	15.2	12.3	10.7	9.8	9.1	8.6
400	15.5	12.6	11.0	10.1	9.5	8.9
450	15.8	12.8	11.3	10.4	9.7	9.2
500	16.1	13.1	11.5	10.6	10.0	9.5
1,000	17.7	14.7	13.1	12.2	11.6	11.1

Noncommercial thinning at age 30, 40; harvest cut at age 50.)

Present Net Worth at 8 Percent

Table 111
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	14	---	---	---	---	---
100	36	18	---	---	---	---
150	58	40	17	---	---	---
200	79	62	39	16	---	---
250	101	84	61	38	15	---
300	123	106	83	60	37	14
350	145	128	105	82	59	36
400	167	150	127	104	81	58
450	189	171	148	126	103	80
500	211	193	170	148	125	102
1,000	429	412	398	366	343	320

Noncommercial thinning at age 30, 40; harvest cut at age 50.

Site Index: 85
Rotation Age: 60

Internal Rate of Return

Table 112
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	12.1	9.7	8.5	7.7	7.1	6.7
100	13.6	11.1	9.8	9.1	8.5	8.1
150	14.4	11.9	10.6	9.9	9.3	8.9
200	15.0	12.5	11.2	10.4	9.9	9.4
250	15.4	12.9	11.6	10.9	10.3	9.9
300	15.8	13.3	12.0	11.2	10.7	10.2
350	16.1	13.6	12.3	11.5	11.0	10.5
400	16.4	13.9	12.5	11.8	11.2	10.8
450	16.7	14.1	12.8	12.0	11.5	11.0
500	16.9	14.3	13.0	12.2	11.7	11.2
1,000	18.3	15.7	14.4	13.6	13.0	12.6

Noncommercial thinning at age 30, 40; commercial thinning at age 50 (1.0 MBF); harvest cut at age 60 (16.0 MBF).

Present Net Worth at 8 Percent

Table 113
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	52	35	12	---	---	---
100	113	96	73	50	27	4
150	174	156	134	111	88	65
200	234	217	194	171	148	125
250	295	278	255	232	209	186
300	355	338	315	292	269	247
350	416	399	376	353	330	307
400	477	459	436	414	391	368
450	537	520	497	474	451	428
500	598	581	558	535	512	489
1,000	1,204	1,186	1,163	1,141	1,118	1,094

Noncommercial thinning at age 30, 40; commercial thinning at age 50 (1.0 MBF); harvest cut at age 60 (16.0 MBF).

Site Index: 85
Rotation Age: 70

Internal Rate of Return

Table 114
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	12.1	9.9	8.8	8.1	7.7	7.3
100	13.3	11.1	10.0	9.3	8.9	8.5
150	14.0	11.9	10.7	10.0	9.5	9.2
200	14.6	12.3	11.2	10.5	10.0	9.7
250	15.0	12.7	11.6	10.9	10.4	10.1
300	15.3	13.1	11.9	11.2	10.7	10.4
350	15.6	13.3	12.2	11.5	11.0	10.6
400	15.9	13.6	12.4	11.7	11.2	10.9
450	16.1	13.8	12.6	11.9	11.4	11.1
500	16.3	14.0	12.8	12.1	11.6	11.2
1,000	17.6	15.2	14.0	13.3	12.8	12.4

Noncommercial thinning at age 30, 40; commercial thinning at ages 50 (1.0 MBF) and 60 (2.5 MBF); harvest cut at age 70 (21.5 MBF).

Present Net Worth at 8 Percent

Table 115
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	69	52	29	6	---	---
100	147	130	107	84	61	38
150	225	208	185	162	139	116
200	302	285	262	239	217	194
250	380	363	340	317	295	271
300	458	441	418	395	372	349
350	535	518	495	473	450	427
400	613	596	573	550	527	504
450	691	674	651	628	605	582
500	769	751	728	706	683	660
1,000	1,545	1,528	1,505	1,482	1,459	1,436

Noncommercial thinning at age 30, 40; commercial thinning at ages 50 (1.0 MBF) and 60 (2.5 MBF); harvest cut at age 70 (21.5 MBF).

REGENERATED STANDS

Site Index: 85
Rotation Age: 80

Internal Rate of Return

Table 116
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	11.2	9.3	8.3	7.6	7.2	6.9
100	12.4	10.4	9.3	8.7	8.3	7.9
150	13.1	11.1	10.0	9.4	8.9	8.6
200	13.7	11.5	10.5	9.8	9.4	9.0
250	14.1	11.9	10.8	10.2	9.7	9.4
300	14.4	12.2	11.1	10.5	10.0	9.7
350	14.7	12.5	11.4	10.7	10.3	9.9
400	14.9	12.7	11.6	10.9	10.5	10.1
450	15.1	12.9	11.8	11.1	10.7	10.3
500	15.3	13.1	12.0	11.3	10.9	10.5
1,000	16.6	14.3	13.1	12.5	12.0	11.6

Noncommercial thinning at age 30, 40; commercial thinning at ages 50 (1.0 MBF), 60 (2.5 MBF) and 70 (3.5 MBF); harvest cut at age 80 (24.5 MBF).

Present Net Worth at 8 Percent

Table 117
First thinning age 30

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	48	31	8	---	---	---
100	105	88	65	42	19	---
150	161	144	121	98	75	52
200	218	200	178	155	132	109
250	274	257	234	211	188	165
300	330	313	290	268	245	222
350	386	370	347	324	301	278
400	443	426	403	380	358	335
450	500	483	460	437	414	391
500	556	539	516	493	470	448
1,000	1,121	1,104	1,081	1,058	1,035	1,012

Noncommercial thinning at age 30, 40; commercial thinning at ages 50 (1.0 MBF), 60 (2.5 MBF) and 70 (3.5 MBF); harvest cut at age 80 (24.5 MBF).

Site Index: 85
Rotation Age: 50

Internal Rate of Return

Table 118
First thinning age 40

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	11.7	8.9	7.5	6.6	5.9	5.4
100	13.3	10.5	9.0	8.2	7.5	7.0
150	14.3	11.5	10.0	9.1	8.4	7.9
200	15.0	12.1	10.6	9.7	9.1	8.6
250	15.5	12.6	11.1	10.2	9.6	9.1
300	16.0	13.0	11.5	10.6	10.0	9.5
350	16.3	13.4	11.9	11.0	10.3	9.9
400	16.7	13.7	12.2	11.3	10.7	10.2
450	16.9	14.0	12.5	11.6	10.9	10.4
500	17.2	14.2	12.7	11.8	11.2	10.7
1,000	18.9	15.8	14.3	13.4	12.7	12.2

Noncommercial thinning at age 40; harvest cut at age 50 (6.6 MBF).

Present Net Worth at 8 Percent

Table 119
First thinning age 40

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	27	12	---	---	---	---
100	62	47	26	5	---	---
150	97	81	61	40	19	---
200	132	116	95	75	54	33
250	167	151	130	109	86	68
300	202	186	165	144	123	103
350	237	221	200	179	158	137
400	272	256	235	214	193	172
450	307	291	270	249	228	207
500	342	326	305	284	263	242
1,000	691	675	654	633	612	591

Noncommercial thinning at age 40; harvest cut at age 50 (6.6 MBF).

Site Index: 85
Rotation Age: 60

Internal Rate of Return

Present Net Worth at 8 Percent

Table 120
First thinning age 40

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	11.5	9.2	7.9	7.2	6.6	6.2
100	12.8	10.5	9.2	8.5	8.0	7.6
150	13.6	11.3	10.0	9.3	8.7	8.3
200	14.2	11.8	10.5	9.8	9.3	8.9
250	14.6	12.2	11.0	10.2	9.7	9.3
300	15.0	12.6	11.3	10.6	10.1	9.6
350	15.3	12.9	11.6	10.9	10.3	9.9
400	15.6	13.1	11.9	11.1	10.6	10.2
450	15.8	13.4	12.1	11.3	10.8	10.4
500	16.0	13.6	12.3	11.5	11.0	10.6
1,000	17.4	14.9	13.6	12.9	12.3	11.9

Noncommercial thinning at age 40, 50; harvest cut at age 60 (12.6 MBF).

Table 121
First thinning age 40

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	36	20	---	---	---	---
100	79	63	42	20	---	---
150	122	106	85	63	42	21
200	165	149	128	107	85	64
250	209	193	171	150	129	107
300	252	236	215	193	172	151
350	295	279	258	237	215	194
400	339	323	301	280	259	237
450	382	366	345	323	302	281
500	425	409	388	367	345	324
1,000	858	842	821	800	778	757

Noncommercial thinning at age 40, 50; harvest cut at age 60 (12.6 MBF).

Site Index: 85
Rotation Age: 70

Internal Rate of Return

Present Net Worth at 8 Percent

Table 122
First thinning age 40

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	10.9	8.9	7.8	7.2	6.7	6.4
100	12.1	10.1	9.0	8.3	7.9	7.5
150	12.8	10.7	9.7	9.0	8.5	8.2
200	13.3	11.2	10.1	9.5	9.0	8.7
250	13.7	11.6	10.5	9.9	9.4	9.0
300	14.0	11.9	10.8	10.1	9.7	9.3
350	14.3	12.2	11.1	10.4	9.9	9.6
400	14.5	12.4	11.3	10.6	10.2	9.8
450	14.7	12.6	11.5	10.8	10.4	10.0
500	14.9	12.8	11.7	11.0	10.5	10.2
1,000	16.1	13.9	12.8	12.1	11.7	11.3

Noncommercial thinning at age 40, 50; commercial thinning at age 60 (2.1 MBF); harvest cut at age 70 (19.2 MBF).

Table 123
First thinning age 40

Selling price $ per	Initial and 10-year periodic cost Dollars					
MBF	5	20	40	60	80	100
	Percent					
50	33	17	---	---	---	---
100	74	58	36	15	---	---
150	115	99	77	56	35	13
200	155	139	118	97	75	54
250	196	180	159	137	116	95
300	237	221	200	178	157	136
350	278	262	240	219	198	176
400	319	302	281	260	239	217
450	359	343	322	301	279	258
500	400	384	363	341	320	299
1,000	808	792	771	749	728	707

Noncommercial thinning at age 40, 50; commercial thinning at age 60 (2.1 MBF); harvest cut at age 70 (19.2 MBF).

REGENERATED STANDS

Site Index: 85
Rotation Age: 80

Internal Rate of Return

Table 124
First thinning age 40

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	10.9	8.9	7.8	7.2	6.7	6.4
100	12.1	10.1	9.0	8.3	7.9	7.5
150	12.8	10.7	9.7	9.0	8.5	8.2
200	13.3	11.2	10.1	9.5	9.0	8.7
250	13.7	11.6	10.5	9.9	9.4	9.0
300	14.0	11.9	10.8	10.1	9.7	9.3
350	14.3	12.2	11.1	10.4	9.9	9.6
400	14.5	12.4	11.3	10.6	10.2	9.8
450	14.7	12.6	11.5	10.8	10.4	10.0
500	14.9	12.8	11.7	11.0	10.5	10.2
1,000	16.1	13.9	12.8	12.1	11.7	11.3

Noncommercial thinning at age 40, 50; commercial thinning at age 60 (2.1 MBF); harvest cut at age 70 (19.2 MBF).

Present Net Worth at 8 Percent

Table 125
First thinning age 40

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	43	27	5	---	---	---
100	93	77	56	34	13	---
150	143	127	106	85	63	42
200	194	178	156	135	114	92
250	244	228	207	185	164	143
300	294	278	257	235	214	193
350	345	329	307	286	265	243
400	395	379	358	336	315	294
450	445	429	408	387	365	344
500	496	480	458	437	416	394
1,000	999	983	962	940	919	898

Noncommercial thinning at age 40, 50; commercial thinning at ages 60 (2.1 MBF) and 70 (3.4 MBF); harvest cut at age 80 (25.0 MBF).

Site Index: 85
Rotation Age: 90

Internal Rate of Return

Table 126
First thinning age 40

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	10.9	9.1	8.2	7.6	7.2	6.9
100	12.0	10.2	9.2	8.6	8.2	7.9
150	12.6	10.8	9.8	9.2	8.8	8.5
200	13.1	11.2	10.2	9.6	9.2	8.9
250	13.4	11.5	10.5	10.0	9.5	9.2
300	13.7	11.8	10.8	10.2	9.8	9.5
350	14.0	12.1	11.1	10.5	10.1	9.7
400	14.2	12.3	11.3	10.7	10.3	9.9
450	14.4	12.4	11.4	10.8	10.4	10.1
500	14.6	12.6	11.6	11.0	10.6	10.3
1,000	15.7	13.7	12.7	12.1	11.6	11.3

Noncommercial thinning at age 40, 50; commercial thinning at ages 60 (2.1 MBF), 70 (3.4 MBF), and 80 (4.6 MBF); harvest cut at age 90 (28.0 MBF).

Present Net Worth at 8 Percent

Table 127
First thinning age 40

Selling price $ per MBF	Initial and 10-year periodic cost Dollars					
	5	20	40	60	80	100
	Percent					
50	30	14	---	---	---	---
100	68	52	31	9	---	---
150	106	90	69	47	26	5
200	144	128	107	86	64	43
250	182	166	145	124	102	81
300	220	204	183	162	140	119
350	258	242	221	200	178	157
400	296	280	259	238	216	195
450	334	318	297	276	254	233
500	372	356	335	314	292	271
1,000	752	736	715	694	672	651

Noncommercial thinning at age 40, 50; commercial thinning at ages 60 (2.1 MBF), 70 (3.4 MBF) and 80 (4.6 MBF); harvest cut at age 90 (28.0 MBF).